September, 1944

JAN 8 1945

THE Refrigeration Industry

INSTALLATION
MAINTENANCE
MERCHANDISING

AIR CONDITIONING
MACHINERY

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UNITED REFRIGERATOR SUPPLY CO.

366 S. MAIN ST. • MEMPHIS, TENN.

I PREDICT...

by Morris Sanders

Industrial Designer of New York

The kitchen of tomorrow will have no taint of the drudgery that characterized it in the past. A symbol of its efficiency will be the new refrigerators you will buy with your War Bonds. I have designs in my files for a horizontal, counter-height refrigerator that enables the housewife to see its entire contents without wearisome stooping. It has multiple compartments with varying degrees of temperature from "deep freeze" to "cool", and a special "private" compartment for ice cubes. There will be no wholesale release of cold air every time the refrigerator door opens, consequently it will be more economical. Furthermore, its cubic area will allow for more actual storage space than in the past.

* * *

NOTE: The Weatherhead Company, one of the oldest and most important manufacturers of parts for the refrigeration industry, is prepared for the day when its four plants will be contributing as actively in peace as it has in war to the country's refrigeration needs.

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

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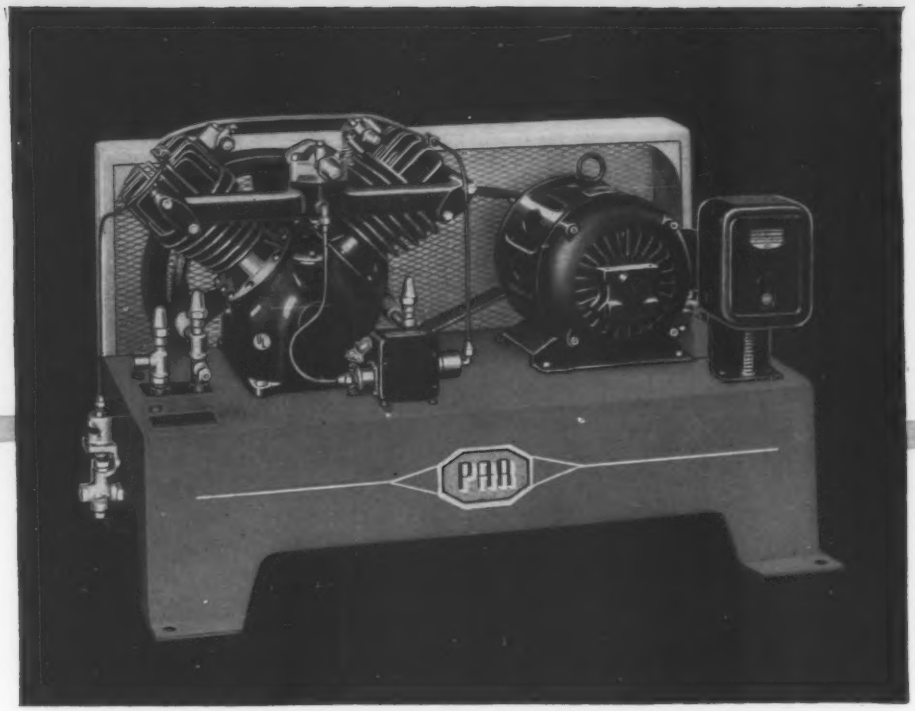

Par Model HW-30

- A 3 H.P. water cooled unit for locker plants, ice cream plants, super markets and multiple water coolers.
- Four cylinders, large capacity, slow speed, crank type compressor with bull's-eye sight oil gauge.
- The fast pull down and high capacity features of this unit assure economical refrigeration.

- ***Write for illustrated brochure of details.***
- ***BY COMPARISON—YOU'LL BUY PAR.***

PAR Division

LYNCH
MANUFACTURING CORPORATION
Defiance, Ohio, U.S.A.

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helps make JOINTS THAT STAY TIGHT

FIRST step in making good, tight joints is to make sure that the tubing is cut off correctly. Crooked cuts, egg-shaping of tubing, ragged cuts and excessive burr — evils resulting from poor cutting methods — all spell trouble in tubing connection work.

That is why a good tube cutter has such an important place in every tool kit. Not only will a good tube cutter make clean, square cuts in a minimum of time, but properly used it leaves little burr and no ragged edges . . . . features which mean so much in making tight flare and solder joints.

Today, with every man-hour precious, it is doubly important that when it is necessary to buy tube cutting tools, you buy the best . . . . tools that are well-designed, well-made, durable and make possible faster and better work. Imperial makes tools like this—and no others. See your jobber.

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536 South Racine Avenue, Chicago 7, Illinois

Small Size for Close Places

● **No. 127-F** Tubing Cutter. A small size cutter that is exceptionally convenient and efficient. Takes ⅛" to ¾" O.D. tubing. Makes clean, square cuts; will not flatten tubing. Dotted line shows position of reamer when in use.

Roller Type with Flare Cut-off Groove

● You cannot buy a better tubing cutter than this Imperial **No. 174-F.** Makes clean, right-angle cuts. Leaves no burrs or chips to clog line. Tubing rolls on two rollers, reducing friction and speeding cutting. Has exclusive flare cut-off groove for removing a damaged flare from tubing with minimum waste. Reamer attached. Cuts ⅛" to ¾" O.D. tubing.

Sawing Vises for Larger Size Tubing

● **Nos. 184-F, 185-F** Sawing Vises. Especially serviceable for cutting larger sizes of tubing. Used with any standard hacksaw to make perfect, right-angle cuts. Tubing will not be crushed or marred. No. 184-F takes 3/16" to 2 3/8" O.D. tubing. No. 185-F takes 1½" to 4" O.D. tubing.

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FITTINGS ● VALVES ● DEHYDRATORS ● FILTERS ● FLOATS ● CHARGING LINES
TOOLS FOR CUTTING, FLARING, BENDING, COILING, PINCH-OFF AND SWEDGING

THE Refrigeration INDUSTRY

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bubbles in champagne
YES
in this Alco Valve test basin
NO

Bubbles in the right place are fine. But when this sharp-eyed Alco Valve inspector sees even the most minute bubbles in this test basin, the valve body casting he is testing goes to the "reject" bin.

Whether bronze, brass or steel, no Alco Valve body casting is taken for granted. And the customary visual inspection is not enough. There must be assurance that the wall of the casting is as leakproof and sound as every working part of the valve.

So every casting is placed in a special device and, with high air pressure inside, immersed in the test basin. Only the perfect castings are retained.

This is another of the many assurances valve users have of dependability and trouble-free performance when they choose Alco. Alco Valve Company, 843 Kingsland Avenue, St. Louis 5, Missouri.

ALCO VALVE COMPANY

Designers and Manufacturers of Thermostatic Expansion Valves; Pressure Regulating Valves; Solenoid Valves; Float Valves.

NOW, MORE THAN EVER, BUY BONDS

Unaccustomed as We are . . .

TO MAKING PUBLIC SPEECHES

WE POINT WITH

PRIDE

TO THE FACT THAT

Sales of Rotary Seals

HAVE SHOWN AN AVERAGE INCREASE OF

77% PER YEAR

IN THE PAST 8 YEARS

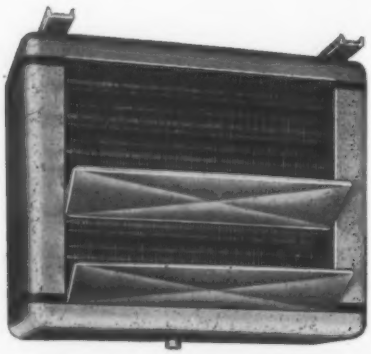
● Yes, there are many good reasons why ROTARY SEALS have proved so popular for original equipment and replacement units as to break all sales records. We think the main reason is that we are specialists in the manufacture of mechanical shaft seals. We make nothing else. All of our research and skill goes into producing this one item. A background of sixteen years in the business is your guarantee of outstanding quality.

ROTARY SEALS

ROTARY SEAL COMPANY

2020 North Larrabee St. Chicago 14, Illinois

SHE WANTS THE BEST... *and so do you!*



Capacities for all applications, with proper sizing to balance high side. Adjustable louvres. Slow speed motors and kidney-type fan blades assure quiet operation and minimum bearing wear.

Housewives don't compromise on food. They want . . . and demand . . . the best. Good food demands good equipment for transportation . . . preservation . . . service. You'll sell more . . . make more . . . by handling only the best refrigerating equipment. Bush Standard Unit Coolers have established an unexcelled reputation for dependable, service-free performance and economical, efficient operation. Heat exchangers engineered for each model . . . and a model for every application.

Bush Standard Unit Coolers have been designed with an unusual margin of safety in coil surface. Sound engineering and thorough testing insure that all ratings are DEPENDABLE.

BUSH MANUFACTURING CO.

HARTFORD CONN · 415 LEXINGTON AVENUE NEW YORK · 549 W. WASHINGTON BLVD. CHICAGO

WAGNER SHADED-POLE MOTORS. For direct-connected propeller and centrifugal-fan applications requiring very small horsepower, and low starting-torque.

WAGNER REPULSION-START-INDUCTION MOTORS. Ideal for driving condensing units, pumps, and blowers.

WAGNER OPEN-TYPE SQUIRREL-CAGE MOTORS are used on blowers, fans, compressors, pumps, etc.

WAGNER DIRECT-CURRENT MOTORS are built to meet direct-current drive requirements.

WAGNER SPLIT-PHASE MOTORS are applied to unit-heaters, oil-burners, fans and blowers and many other types of equipment.

WAGNER TOTALLY-ENCLOSED MOTORS. Particularly adaptable for unit-heater applications.

WAGNER CAPACITOR-START INDUCTION-RUN MOTORS are particularly adaptable to refrigerators, stokers, and other household appliances.

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are but one of several
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(Recording Speedometer)
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Consider
Wagner MOTORS
. . . On all Postwar Refrigeration and Air Conditioning Equipment

Foresighted manufacturers are now planning refrigeration and air-conditioning equipment for postwar markets. Dependable motor power must be given careful consideration, and Wagner engineers have designed motors that will do an economical and dependable job on postwar equipment.

The skill and facilities Wagner has gained in years of producing good dependable motors for air-conditioning and refrigeration application are available to you in solving the problems involved in planning and designing your equipment to meet postwar demands.

Send for these **BULLETINS**

Bulletins MU-182 and MU-183 describe and illustrate the complete line of Wagner motors. Bulletins MU-7B and MU-30B give complete service instructions.

M44-20

Wagner Electric Corporation
ESTABLISHED 1891
6442 Plymouth Avenue, St. Louis 14, Mo., U. S. A.
ELECTRICAL AND AUTOMOTIVE PRODUCTS

THE BRUNNER MANUAL CAN HELP YOU!

Here's an abstract from the Brunner Refrigeration Service Manual under the headline: "Service Instructions for Repulsion—Start—Induction Brush-Lifting Motors" under problem sub-heading "Failure to Start":

Probable Cause—Test and Remedy

Fuses blown. Check fuse capacity, they should not be greater in ampere capacity than recommended by appliance manufacturer; in no case smaller than full-load ampere rating of motor, and a voltage capacity equal to or greater than voltage of supply circuit.

Open-circuited field or armature. Indicated by excessive sparking in starting, or refusal to start at certain positions of rotor, or by humming sound when switch is closed. Examine for broken wires, loose connections or burned segments in commutator at point of loose or broken connection. Inspect commutator for foreign metallic substance which might cause short between commutator segments.

Worn brushes or sticking brushes. When brushes are not making proper contact with commutator, the motor will be weak in starting torque. This can be caused by brushes worn, brushes sticking in the holders, brush springs weak, or commutator dirty. Commutator should be polished with fine sand-paper (never use emery). Commutator should never be oiled or greased.

Improper brush setting. Unless a new armature has been installed the brush-holder or rocker arm indicated should be opposite index and locked in position. If new armature has been installed the position may be slightly off original marking.

Improper line connection. See that connections are exactly like connection diagram which is sent with motor. Motor may through error be wired for higher voltage and connected to lower voltage supply.

Shorted rotor. Remove brushes from commutator and impress full voltage on stator. If there are one or more points at which rotor "hangs" or fails to revolve easily when turned, the rotor is shorted. By forcing rotor to the position where it is most difficult to hold, short can be located as the shorted coil will become hot. Do not hold in position too long or coil will burn out.

BRUNNER

Your job is to secure more efficient performance and longer life from the refrigeration units you are called upon to service. Your Brunner Manual can help you. If you don't have a copy, we'll be glad to furnish one for $2.50. Write to:

Brunner Manufacturing Company, Utica 1, New York, U. S. A.

SPORLAN SELECTIVE CHARGES

G-K-U-Z-O-L-C

THE ARMY AIR FORCE

both give **PEAK PERFORMANCE**

for like each type of army ship, each Sporlan charge has a specific job to do!

SPORLAN VALVES

From comfort cooling to low temperature refrigeration, with the wide range of applications in between, no one charge can perform perfectly under all conditions.

Sporlan has developed selective charges G-K-U-Z-O-L-C which are designed to give the best operating characteristics for each class of installation.

Only by using SPORLAN valves can you be assured of PEAK Performance on EVERY installation.

Sporlan manufactures Solenoid Valves... Solenoid Pilot Controls...Modulating Pilot Controls...Refrigerant Distributors and the only Thermostatic Expansion Valves with Selective Charges.

For consultation on any refrigeration or air conditioning valve problem, contact

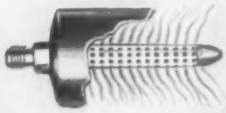
SPOEHRER-LANGE COMPANY

3723 COMMONWEALTH AVENUE • ST. LOUIS 17, MISSOURI

DESIGN.. ....MAKES THIS REFILLABLE DEHYDRATOR MORE EFFICIENT

This product is available under L-126.

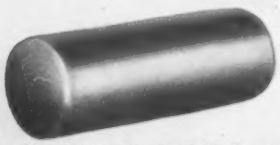
Cross section of Type 743 Henry Dehydrator.



Greater Efficiency Because of Patented Dispersion Tube. Entire volume of the dehydrant is exposed to penetration by refrigerant.

Strainer Tube Can Be Easily Cleaned or Replaced. The reinforced monel strainer tube is silver soldered to the outlet fitting eliminating bypassing of the refrigerant.

Abso-Dry Pressure Sealing Process. Loosening of seal cap prior to installation produces hissing sound due to escape of dehydrated air indicating that dehydrant is absolutely dry.



One Piece Drawn Brass Shell. Type 743 Dehydrators in the 6" length are drawn in dies so that they have only one joint—larger sizes have soldered end caps at both ends.

Easy to clean! Easy to restore to original efficiency by merely replacing the dehydrant! These are your first reactions when you remember field problems encountered in servicing Refrigeration and Air Conditioning installations. Apart from the refillable feature, however, Type 743 Henry Dehydrator should be the choice of anyone interested in more efficient removal of moisture in a system. This is because many of the standard Henry features of design and construction that have made Henry Dehydrators the choice of the Industry are incorporated in this refillable dehydrator. You will find these features described in detail on the left.

Type 743 Refillable Dehydrator is available in a series of sizes and capacities that will take care of the majority of commercial installations. Best of all, the unit is so reasonably priced that it will pay any service or contracting organization to use it as standard equipment.

HENRY VALVE CO. TRADE MARK

HENRY VALVE CO.

3260 WEST GRAND AVENUE, CHICAGO 51, ILLINOIS

PACKLESS AND PACKED VALVES • STRAINERS • DRYERS FOR REFRIGERATION AND AIR CONDITIONING
AMMONIA VALVES • FORGED STEEL VALVES AND FITTINGS FOR OIL, STEAM AND OTHER FLUIDS

APPROVED FOR NAVY, MARITIME COMMISSION AND ARMY USE

THE HALLMARK OF *Quality*

The rectangle and triangle design shown above is the Mueller Brass Co. hallmark for refrigeration products. It appears in our advertising, on all our packages, on our labels and even on the goods themselves. It is generally carried in red, blue, white and black. Variations of color may sometimes be used, but the shape of the mark itself is always the same.

Our trademark is a point of honor with us as well as a mark of identification of our goods. It means that products of our manufacture carrying it are the best we know how to produce ...and time-tested for the purpose they are intended to serve.

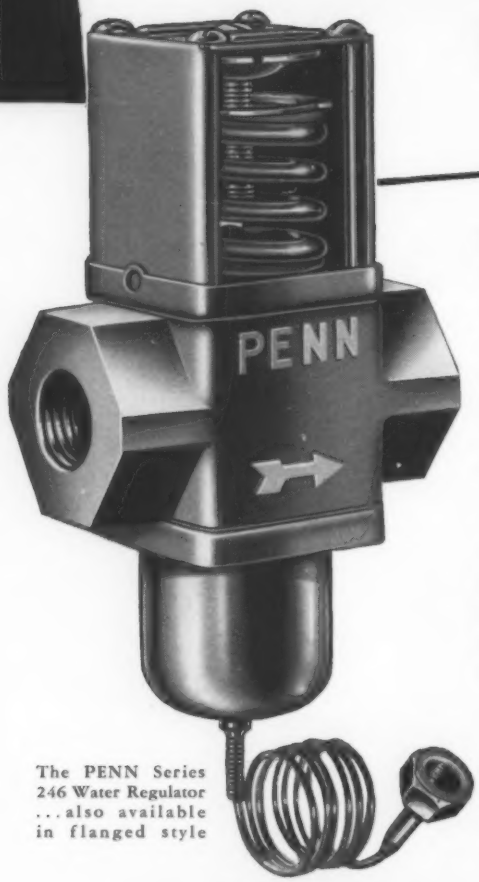
The Mueller Brass Co. line of refrigerator valves, fittings and accessories is exceptionally complete. Service engineers can place full confidence in them. Rigid laboratory control, skilled engineering, highest quality materials, precision workmanship and rigid inspection combine to make our products constantly dependable.

Mueller Brass Co. refrigeration products are in use with our armed forces on practically every front. They are incorporated in units produced by other manufacturers who depend upon us for prompt service and quality products.

Write for catalog number 2007.

MUELLER BRASS CO.
PORT HURON, MICHIGAN

Water rolls off a duck's back ...BUT IT LEAVES ITS MARK ON VALVES!



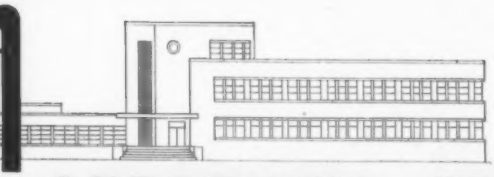
The PENN Series 246 Water Regulator ...also available in flanged style

● Every water valve is fair game for that destructive trio—Corrosion, Sedimentation and Rust. You can't shut them out entirely . . . but you *can* render them harmless, if you *keep them away from sliding parts.*

That's what PENN has done in the new Series 246 Water Regulator, designed so that *no sliding parts make contact with the water.* No chance here for abrasive deposits to form.

With sliding parts out of harm's way, there's no trouble from sticking seats or rusty range springs . . . no possibility of premature wear. PENN has eliminated water hammer as well, yet the valve is extremely sensitive to refrigerant head pressure changes. Manual flushing is another feature—of particular value in new installations.

But see for yourself how advanced engineering design has put this new PENN Water Valve in a class by itself. Write *today* for your free copy of Bulletin R-1986. *Penn Electric Switch Co., Goshen, Ind.* Export Division: 13 East 40th Street, New York 16, U.S.A. In Canada: Powerlite Devices, Ltd., Toronto, Ont.



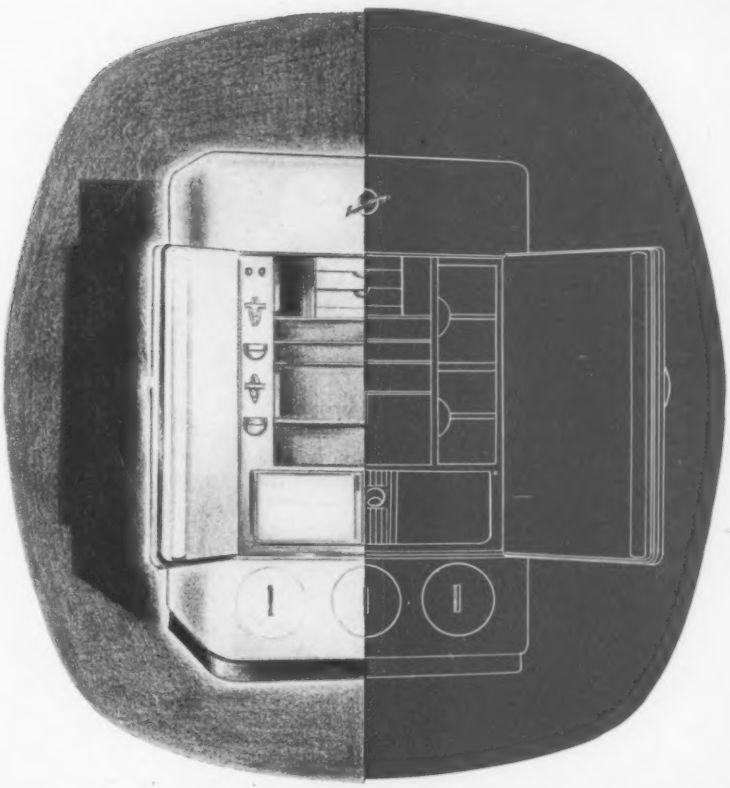
PENN

AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

Whose POSTWAR REFRIGERATOR?

For the answer to that, see Mrs. America, No. 1 designer. Here's a preview of what she expects in tomorrow's models.



By Glenn Muffly
Consulting Engineer

MOST of the proposed post-war refrigerators we hear about seem to have been designed to please their designers rather than to please the women who will use them.

The man at our right in the club car says that the Whosis Corporation is preparing to bring out a refrigerator patterned after the device our grandfathers called a "caster." Note for the younger generation: this was a miniature merry-go-round carrying salt and pepper shakers, a vinegar cruet and bottles of catsup, salad oil, etc. It was designed to occupy the center of the dining table and spin around.

The gentleman at our left adds that Umpah Aircraft expects to make a plastic cabinet with transparent walls, so that you can see what is in it without opening the door.

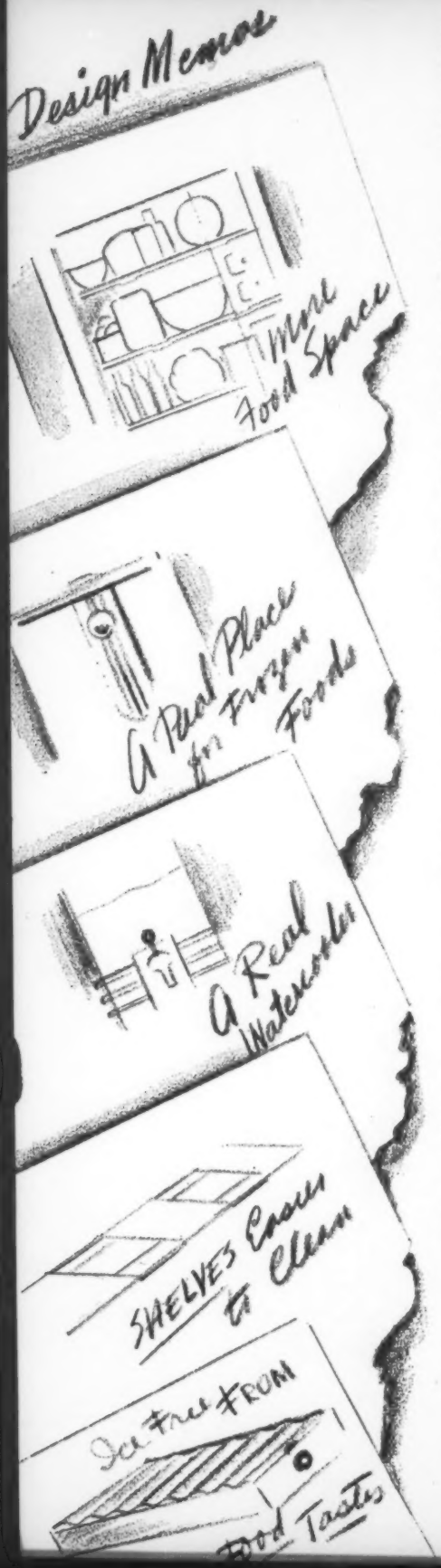
Another speaks up to say that every home is going to have two refrigerators, the old one in the kitchen and a new home freezer in the cellar. He tells of a friend who brought a deer back from the north woods last fall, and kept it all year in such a basement box. He adds that every farmer will keep a frozen hog or beef carcass on hand.

The man who follows the pseudo-scientific press tells of some inventor who has a refrigerator system costing pennies instead of dollars. It appears to be the reverse thermocouple idea.

Another recalls having read of one that does not even use electricity. You just pour in a gallon of this and a quart of that. These mysterious compounds "produce cold" when they mix.

A new arrival says that these ideas may be fine, but the real answer is a refrigerator with several drawers in place of the one big door. He expects it to be a lot more efficient because the cold air does not spill out every time you open it.

This reminds another fellow that he has always believed a refrigerator



ought to be built like a flat-top desk, with a work-table top and drawers below.

Next comes the old one about cooling the house and refrigerator with the same machine.

A Different Story

Let the scene shift to a gathering of manufacturers who were making electric refrigerators in pre-war days, and we hear quite a different story. The first post-war refrigerator, they say, is going to be just like the last models produced, with a few minor improvements to be sure, but not anything radical. "We have to start with the old tools, you know."

Now suppose we ask a few dealers who hope to get back to selling refrigerators next year. Each expects *one* refrigerator to be greatly improved. This particular manufacturer has been able (so the dealer says) to continue refrigerator development while working 100% on war production. The results are some marvelous new features regarding which word has come to him by the underground.

The service man should not be forgotten in our survey, for he really has a lot of first-hand experience with refrigerators in actual use. He wants a job on which any part is easily replaced in the kitchen. He also wants the overhauling done in his shop, not in some factory branch. Sealed units, he says, should go together with gaskets, not be welded up.

Finally, let us ask a few thousand of the housewives who are actually going to use this post-war refrigerator. The answers are numerous and varied, with very little said about the features proposed above.

The first six housewives you ask are apt to give you six different answers, but if you ask a hundred of them to express their thoughts about the ideal post-war refrigerator, you will find a lot of agreement on several points.

HERE ARE SOME OF THE MAIN THINGS FOR WHICH THE HOUSEWIVES ASK:

More Food Space:

One point on which the women will be practically 100% in agreement is that the next refrigerator they buy will be larger than the one they now have. The industry has, in part, been to blame for the sale of smaller refrigerators than should have been purchased, because the bulk of the advertising has been devoted to the lowest priced models. Originally, it was concentrated on 5 ft. models, then price competition pushed it down to the 4 ft size. Smarter competition brought it up to the 6 ft. size. Just before production stopped, the 7 ft. was leading and the trend is still upward.

A Real Place for Frozen Foods:

Regardless of what happens in the locker storage line, in processing of frozen foods in the home, and in the line of separate home freezers for storing large quantities of frozen foods in the home and on the farm, the average householder will want a refrigerator which has ample provision for storing several packages of frozen food. This must be kept at a temperature below 10° and preferably at a fairly constant temperature not far from 0°F. The pre-war refrigerators, having only one evaporator and no place to put a package of frozen food without removing an ice tray, are not satisfactory for this purpose. Whether the frozen food comes from a rented locker or the store, it is essential that the household refrigerator have a compartment large enough for a half-dozen packages held at a constant low temperature.

When unexpected guests arrive or fewer meals are eaten at home over the weekend, the housewife will have the extra frozen food or the space to store what is not used.

The frozen food storage space should not require frequent defrosting nor be affected in any way by the normal defrosting of the surface which cools the main part of the refrigerator. Where the frozen food storage space is just a small section of the regular evaporator, the frozen foods thaw out when the refrigerator is defrosted. Thawing and re-freezing of frozen foods breaks down their structure and must be avoided if frozen foods are to be kept in the best condition.

Another point about which we will hear more as the usage of frozen food compartments increases is the fact that the door of the freezer freezes shut and cannot be opened without the use of tools. Such doors, whether they be inner doors or outer doors of the refrigerator, should be provided with means for preventing this freezing of the door or with means for

breaking the ice seal easily without resorting to the use of tools and without putting any undue strain on a part of the refrigerator.

A Real Water Cooler:

One of the features often asked for is a water cooler which is more convenient than the usual bottles and small containers, which occupy shelf room and are a nuisance to refill. The ideal water cooler will hold gallons rather than quarts of water, or be connected with the water supply so that it is not necessary to refill after each meal or a few drinks of water. This feature was incorporated in some of the very early iceboxes, but, in general, the design included an outside faucet, which was in the way and being attached to a pipe through the insulated wall caused a greater heat leak into the refrigerator during a 24-hour period than is caused by many openings of the door to get ice water. On a modern refrigerator having a door which covers substantially the entire face of the cabinet, there is no suitable place to locate a faucet, hence it must be inside. That is the more efficient place for it, anyway.

No Defrosting or Fully Automatic Defrosting:

Here is one of the things about which the ladies have quite a lot to say. If the defrosting is accomplished by pulling the plug or turning a switch and there is no provision for automatic re-starting, it is very easy to forget to plug in again or re-set the control after defrosting. It is also quite usual to forget to defrost until just before a party is scheduled or a special meal is to be prepared, and then there is not time to do it and still have the required amount of ice or frozen dessert ready for the special occasion.

Along with this defrosting complaint, there is reference back to the point above mentioned about keeping frozen foods in good condition while the evaporator which cools the main food space is defrosted. The answer to all of this defrosting problem is that the refrigerator should not have any frost in sight in the main food space at any time. It will be non-frosting or arranged to defrost at every cycle, not just once a day or once a week.

One of the most aggravating things associated with present refrigerators is the drip pan. This is intended to take care of defrosting, but if the defrosting is automatic the pan is forgotten and is apt to run over. It is a nuisance to empty it when full or nearly full, and users are not happy about it. The fact is that the drip pan was inherited from the old icebox and merely put inside of the refrigerator instead of on the floor. It is due to disappear entirely, and there will be means for disposing of the drip water automatically as it is collected.

A Control that Requires no Adjusting:

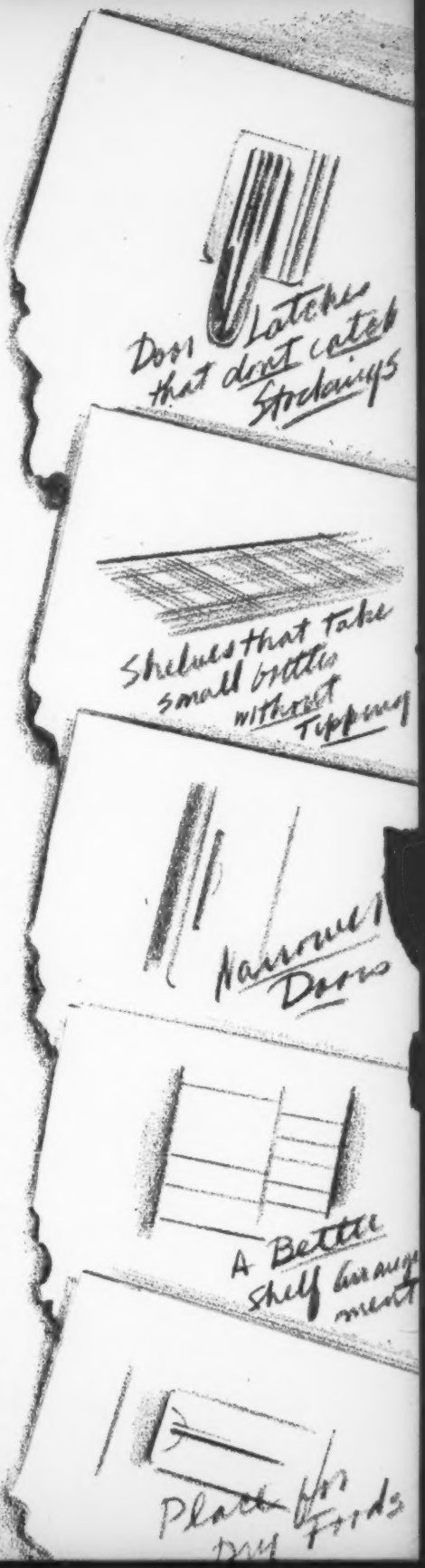
An electric refrigerator should be fully automatic, yet most of them have been provided with a knob, screw or lever and the user instructed to turn it this way or that when the kitchen temperature goes up or down or it is desired to do a fast job of freezing. This "cold control" is there because the thermostat is not fully automatic. Often the user forgets to re-set it after freezing a dessert and freezes other foods. She forgets to re-set it when the weather changes, and finds that the refrigerator is too warm or has frozen some food not intended to be frozen. The answer to this is, of course, a thermostatic control which maintains constant conditions inside of the refrigerator regardless of what goes on in the kitchen or outdoors and regardless of what demands may be made on it for freezing ice or desserts or taking care of other special emergency loads.

Higher Humidity:

Humidity has long been regulated in large cold storage plants and there were a few high-humidity household refrigerators on the market before the war. High humidity is scheduled to become a standard feature of the main food compartment of the household refrigerator. In order to cool the air of the food compartment without removing too much moisture from it, we must have a larger area of cooling surface exposed to the air, and this surface must not be cold enough to collect frost.

Another problem associated with the high-humidity refrigerator is that while high humidity is much better for the food in that it does not dehydrate it, users have found that some foods do not keep as well in a high-humidity cabinet as they formerly

Continued on page 38


Door Latches that don't catch Stockings
Shelves that take small bottles without Tipping
Narrower Doors
A Better Shelf Arrangement
Place for Fruits

The Causes and Cure of Watercooler Troubles

The water cooler field, more important today than ever, presents a real opportunity for the service engineer.

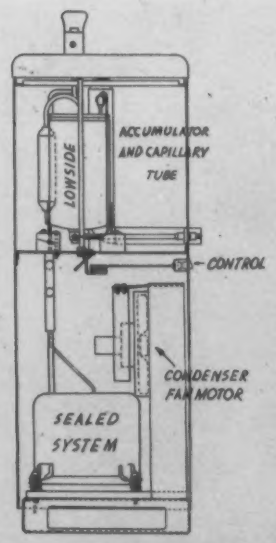
By W. M. D'Zorni
Ebco Mfg. Co.

IMPORTANT at any time, proper servicing of electric water coolers has assumed even greater importance during the present war period, especially in manufacturing plants producing materials for either direct or indirect military uses. This is because, in these manufacturing areas, large numbers of persons are now working in locations in which, prior to the war, comparatively few persons normally would be working.

With a larger group of persons occupying a smaller area, sanitary and other working conditions must necessarily be of a high order, otherwise production will not maintain the required pace. Plant studies have definitely shown that there is a marked relationship between the availability of properly cooled drinking water and the rate of production.

Under these conditions, it is important that the refrigeration service man equip himself to render prompt and efficient service when failures in water-cooling systems occur.

To service and maintain electric water coolers properly, there are several fundamental factors by which the refrigeration service man should be guided. Preventive maintenance, which consists of periodic inspections throughout the year, has not been followed very generally by users of



Water cooler with sealed condensing unit, showing location of functional parts.

In office or factory, properly cooled water aids efficiency.

water-cooling equipment. The average user has not been advised of the advantages of routine inspection service, and as a result has waited until rather serious trouble has developed, and then called for the service man to make the necessary repairs immediately.

Real preventive maintenance, if the service man could develop it, would include, in addition to routine inspection, the proper education of the users in the operation and care of their water-cooling equipment.

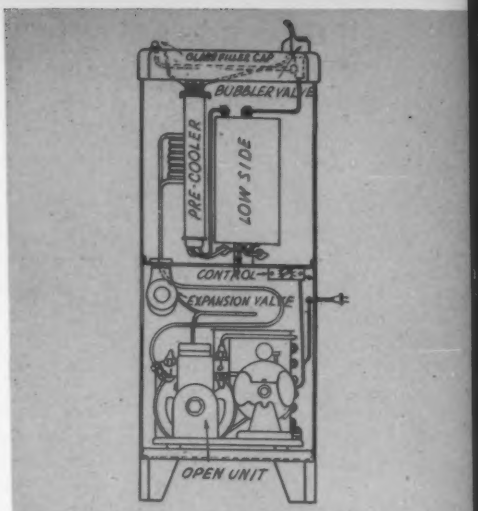
Electric water coolers, self-contained drinking fountains, and other types of water-cooling equipment in use throughout the country today are equipped both with open type reciprocating condensing units and hermetically sealed type systems. Maintenance and servicing problems encountered on both types of systems are varied.

Generally, the service man's first association with a water cooler servicing job is a telephone call from the user that his water cooler is out of order—that the condensing unit runs continuously but does not cool the water, that the system fails to function, or that there is a leak. With a complaint of this type, the actual trouble the service man might encounter when he gets to the job could be almost anything.

As his first step in locating the source of the complaint, the service man should install both pressure and compound gages on the compressor. This will enable him to determine more readily exactly what steps need be taken to correct the condition.

The service man should also check for proper cycling of the refrigeration system, proper oil level in the compressor, correct charge of refrigerant, and proper operation of the thermostat. The system should be checked thoroughly for leaks. The service man should also make sure that the temperature of the drinking water is from 40-42° minimum temperature, which is sufficiently cold for average consumption, and determine whether the low side cooling tank is cooling the proper quantity of water for which the cooler was designed.

The most commonly used hermetically sealed type of refrigeration system used in cooling water employs the principle of forced air circulation to accomplish condensor cooling. The unit is equipped with a motor and fan which is wired in series with the temperature control and stops when the compressor motor stops. When service is required on this type of system, the service man should carry with him a calibrated test relay for checking units for electrical trouble as indicated. This testing unit should include starting leads, lamp, and watt meter.



Side view of water cooler with open-type condensing unit, showing principal parts.

Even on sealed systems, many repairs can be made in the field.

LOCATING TROUBLE SOURCE

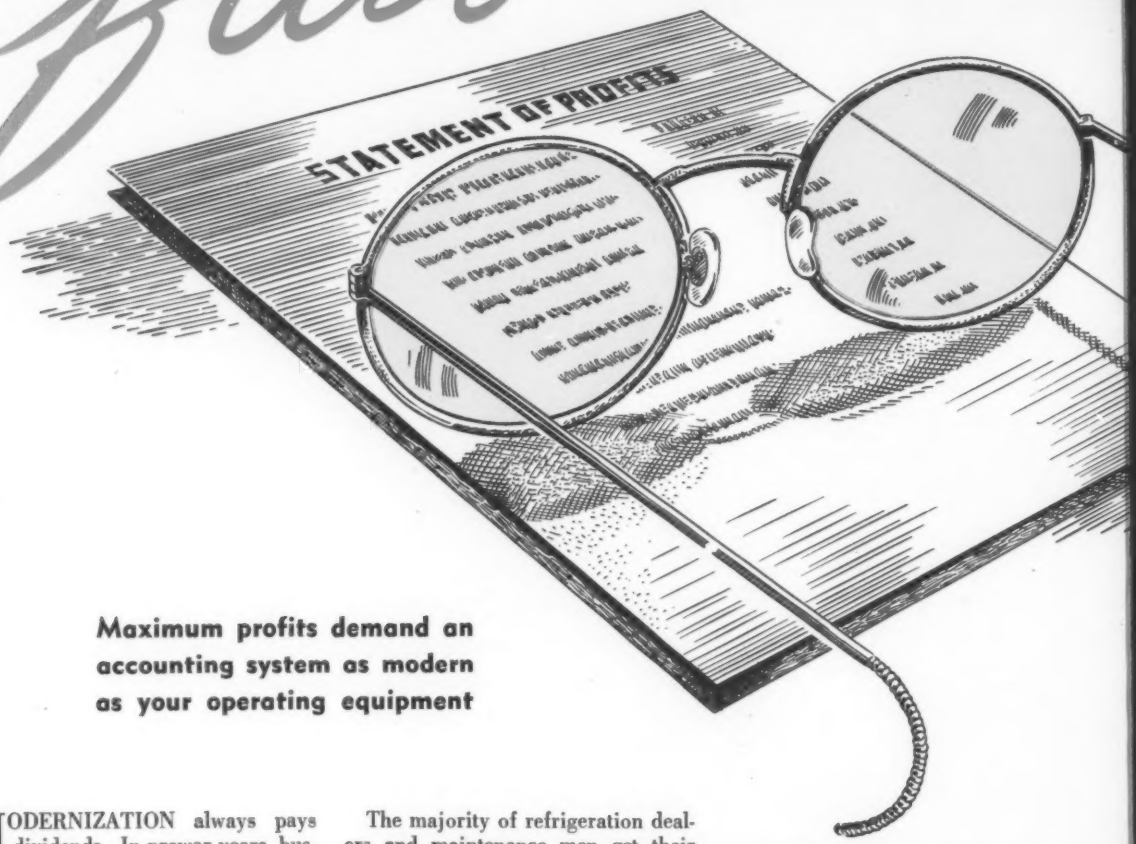
It is first necessary to determine whether failure of the system is in the motor itself or in outside wiring. Motor failure in a sealed system can generally be attributed to: (1) motor wirings grounded; (2) motor windings open; (3) motor windings shorted. The service man should connect a watt meter in the motor circuit, using the test starting leads for starting the unit, and then start up the motor and allow it to run for about 10 minutes. If, at the end of this period, a wattage in excess of the limit set by the manufacturer is indicated, the motor should be considered inoperative. In cases of this type, the following tests should be applied:

(1) Using a test lamp, plug into a convenient outlet and ground one test point on the compressor housing. Place the other point successively on

Continued on page 40

If you're looking at post-war prospects through rose-colored glasses . . . .

Quit Kidding



Maximum profits demand an accounting system as modern as your operating equipment

MODERNIZATION always pays dividends. In prewar years, businessmen accepted this as an axiom, if they were wise, remodeling whenever necessary, or installing the latest servicing equipment, because it meant more coin in the till and better satisfied customers. After the war, modernization will be in full flower. Much new equipment for merchandising and servicing sales will be offered refrigeration dealers and maintenance men, and those who invest in postwar rehabilitation should make money. But here's the rub. You can't make maximum profits unless you use an accounting system as modern as your operating equipment, so you must utilize a method that pictures in bold relief all elements of operation, thus providing a dependable guide to managerial efficiency.

The majority of refrigeration dealers and maintenance men get their financial information and job costs from an accounting system that long has outlived its usefulness. Business has entered a new era. Methods more or less adequate in prewar days will not assure maximum profits in the postwar tomorrow.

Dealers and maintenance men should scrap or overhaul their antiquated accounting systems now. Here are the reasons why:

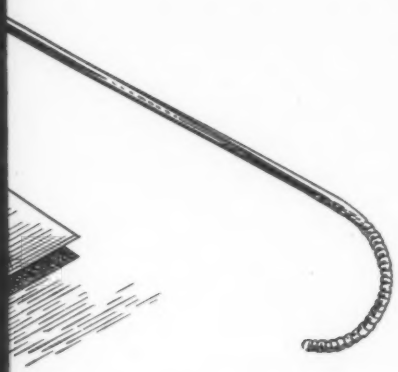
1. Uncle Sam demands accurate accounting. Every item of income and outgo must be recorded accurately, to make sure you do not over-pay or short-change the government on income tax. In both instances, you will be out-of-pocket, because the government auditors will penalize you if you inadvertently understate your tax liability.

Lack of adequate bookkeeping facilities will not excuse the error. The government does not specify the method of bookkeeping to use, but it does demand that it clearly reflect income and be easily interpreted by auditors. The high rates in effect today will result in more minute inspection of taxpayers' books, hence the dealer and service man in particular, should review his recording practises now, and improve them where necessary, or install an adequate system if he has been using faulty debit and credit technique.

2. Profitable pricing. Businessmen of old used their mother-wit or

Yourself...

By Fred Merish



rule-of-thumb methods to price their wares and services. Because the old way of life was simpler and more stable, they sometimes did all right for themselves, even though they guessed at their selling prices. Today, guesswork, is taboo, because profitable pricing demands a knowledge of your costs and overhead expense, which you can't acquire unless you have a good bookkeeping system.

The cut-throat competition that has bedeviled this industry from time to time is due in large measure to faulty accounting. Unless reforms are instituted now, the postwar period won't mean much to the dealer or serviceman with an obsolete method of costing jobs and recording income and outgo.

In the final analysis, a great deal of business is done on speculation, but there is a big difference between a haphazard "guestimate", like playing the ponies on a hunch, and a pricing system evolved from scientific planning based upon an analysis of all pertinent elements of a business as reflected by the books.

3. Monthly profit-and-loss statement analysis. Unless you analyze a profit-and-loss statement monthly, you are playing with a booby trap from now on. Once upon a time, when the going was more placid, an annual statement may have sufficed. Today, conditions may change overnight, even more from month to month, and this instability will carry over to the postwar period for some time. We doubt if anyone can do business with profit at the same old stand in the same old way, either now or in the postwar tomorrow.

You must know where you stand from month to month, not year to year, as was the practice in prewar days. Operating results must be checked, and costs analyzed monthly. To let a longer period elapse between check-ups may cause heavy loss. An accurate monthly profit and loss statement can be obtained if the accounting system is adequate.

4. Experience figures. Some years ago, businessmen held fixed ideas as to mark-up or margin, overhead expense, and other ratios to sales. A businessman would figure that if he marked up his offerings 40 per cent, for example, he could make a profit, because that was common trade practise. Because the general spread was ample, some got by with this "bingo game."

Later on, competition became more keen, and wiser heads realized that experience figures based on general trade practises did not always show a profit, so they began getting the low-down from their books and based their computations thereon. Now comes a new phase of the problem.

Since Pearl Harbor, high taxes, artificial restrictions, and a devastating war have so distorted our economy, to all indications permanently, that prewar experience figures on job costs and overhead ratios no longer hold. You've got to build experience figures anew, and that requires accurate accounting. Those already using a good system should note this change, scrapping experience figures of by-gone years and building up new check-figures since Pearl Harbor, against which to compare their estimates, job costs, and the ratios shown on monthly profit-and-loss statements.

There is little use analyzing results unless you have standards of performance—good, bad, or indifferent—against which to compare results. Your experience figures, built up over prior periods, provide these yardsticks. Every business is different. One businessman's profitable ratios may be another businessman's poison. A backlog of experience figures is essential to profitable management, and this can be acquired only with an accurate accounting system of your own—not dependence upon figures from outside sources.

5. Fixed burden. Variable expenses, such as light, heat, and office expense, can be cut if overhead is high; but fixed expense, such as depreciation, interest on mortgage, and taxes, cannot be cut. Some dealers and servicemen have a higher ratio of fixed expense than others, which makes it more difficult for them to get out from under a costly overhead. Fixed burden often gets out of bounds because no attention is paid to it.

Where an accurate accounting system is part of the business curriculum, this seldom happens, because the books disclose the ratio of fixed burden on the profit-and-loss statement. In the postwar period, when expansion and modernization will run into sizable sums in all fields, it behooves the dealer to be conservative in his investments along these lines and make sure that he does not over-expand, increasing his fixed burden to the detriment of profit when sales drop off after the postwar boom has spent itself.

6. Supplemental records. Stock control cards, budgets, a tax file for collecting tax data, depreciation schedules, petty cash records, time slips, estimate forms, job cost records, etc., are modern recording tools that must be used supplemental to ledger work from now on to provide

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BTU News • Laws • Trends

FREEZER FORECAST

MORE than a dozen leading manufacturers will be in the market with "home freezers" as soon as the materials situation will permit. There seems little doubt that the major distribution of these units will be through refrigerator dealers. A survey completed recently by Edison General Electric Appliance Co., however, indicates that refrigeration dealers won't be alone in the field.

The Hotpoint study, which covered approximately 4,000 locker plants, reveals that 79 per cent of these operators plan to sell home freezers post-war, whereas only 7 per cent sold them previously.

Interesting also is the fact that 52 per cent of the locker plants now retail frozen foods, and 81 per cent plan to do so after the war Eighteen per cent plan to distribute by truck on a regular schedule.

Refrigeration outlets, however, should continue to be the No. 1 merchandisers of home freezers. Selling these units will require aggressive advertising, display, salesmanship, and servicing, in all of which dealers have had long experience, and which they understand thoroughly.

This brings up the question whether household refrigerators of the post-war period will be equipped with frozen storage compartments. As public acceptance of frozen foods grows, increasing demand for frozen foods units undoubtedly will be mirrored in standard refrigerators.

REPAIR PARTS

REPAIR and replacement parts for commercial refrigeration equipment are exempt from Suppliers' Inventory Limitation Order L-63 under the most recent amendment to that regulation. This allows suppliers to maintain a larger inventory than would normally be the case if they continued to operate under the order.

A recent industry advisory committee meeting had reported that inventories of commercial refrigeration repair parts were becoming "dangerously low", and this action has been taken in an effort to correct that situation. Previously, WPB's Wholesale and Retail Trades Division had issued instructions to its "processors" to increase the amount rated to 120 days where 90 days was specified by L-63, and to 150 days where 120 days was specified in the order.

The repair parts situation in the household refrigerator is improving, but certain components continue to be short, including some hardware items. Being discussed now is an amendment to L-5-c which would allow the making of repair parts for inventory up to twice the number of those parts sold by a manufacturer in the second preceding calendar quarter.

Five companies have been authorized to make hermetically sealed units for replacement purposes.

Refrigerator owners covered in a recent survey by OCR on the repair status of their equipment reported that in 9 per cent of the cases repairs were required in the first three months of the year, and that only a little more than half the repair demand was met.

Sixty-three per cent of the refrigerators reported on were five years or more old.

AIR CONDITIONING

YEAR-AROUND air conditioning ranks high in the demands of prospective postwar home buyers and builders, in a survey recently completed by the National Association of Home Builders.

In the survey, 54 per cent of consumers said they would not build or buy if they could not get complete, year-around air conditioning. And 72 per cent of the persons answering said they expected this improvement to be available—at their price—within 10 months after the war.

FREON

EXCEPTIONS to the ban on the use of "Freon-12" for comfort air conditioning have been made in cases of "windowless" buildings and such places as have no other means of adequate ventilation, and in the case of residences where air conditioning is necessary to protect the life or restore the health of a person suffering from a serious disease.

To get "Freon-12" for such a use, the owner or operator must write WPB (or wire, in case of emergency) describing the building in which the system is located, and telling just how it fits into the situations described above, the quantity of "Freon-12" needed, and the name of the probable supplier.

Despite the fact that production of "Freon-12" has been and is being increased, conservation still is necessary to provide for necessary uses. Useful tips along these lines are given in the article beginning on page 24 of this issue.

RECONVERSION

WPB's policy on reconversion was explained to a recent meeting of the mechanical refrigerator industry advisory committee. There are four so-called "reconversion" orders: the first, permitting widespread use of aluminum and magnesium, was issued on July 15; the second, authorizing experimental models, on July 22; the third, permitting orders to be placed for machine tools required to resume civilian production, was issued about the end of that month; and the fourth (or "spot" authorization order), was set for about August 15.

Continued on page 48

DAVISON'S SILICA GEL SETS THE STANDARD FOR DRYING AGENT PERFORMANCE...NO. 5

Chemically Inert

...NON-REACTIVE

PROCESSED ESPECIALLY FOR THE DEHYDRATION OF REFRIGERANTS

Davison's Silica Gel will not attack metals or alloys. This advantage, *plus* the fact that Davison's Silica Gel adsorbs and *holds* acids that cause corrosion gives you complete freedom from hazards that affect the life and performance of the unit.

Other advantages of Davison's Silica Gel: 1—Acts instantly; 2—Its maximum capacity is unaffected by oil; 3—It will not cake nor powder; 4—It will not channel in the cartridge . . . *maximum pore surface and volume is presented to refrigerant at all times.*

Specify Davison's Silica Gel . . . in bulk for refill and in factory-charged dehydrators . . . from your jobber.

THE DAVISON CHEMICAL CORPORATION

Progress through Chemistry

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Canadian exclusive sales agents for DAVISON'S SILICA GEL: CANADIAN INDUSTRIES LIMITED, General Chemicals Division

SMALL MOTOR PRODUCTION

Members of fractional horsepower electric motor industry advisory committee agree the industry should be able to resume production of appliance motors within 60 days after military programs are canceled.

The committee recommended that if manufacture of civilian appliances is resumed prior to the cancellation of military program, orders for civilian purposes be identified in order that manufacturers may be in a position to prevent interference with production of any motors for the war effort.

Production of motors for May increased 8 per cent over April of this year and was 20 per cent above May, 1943. AC (Alternating current) motor production for May was 50 per cent higher than in May, 1943, and aproximately 5 per cent higher than April, 1944. Preliminary June figures, including those for AC motors, show slight advances over May.

It was agreed that the scarcity of fractional horsepower motors should not be regarded as an obstacle to resumption in the production of civilian appliances. The same labor bottleneck that restricts motor production will restrict the production of civilian equipment.

LOCKER MEN TO MEET

Sixth annual convention of the National Frozen Food Locker Association will be held from September 24 to 27 in Columbus, Ohio. Convention headquarters will be the Deshler-Wallick Hotel. In addition to a program of business meetings, refrigeration and other equipment manufacturers serving the locker industry will have exhibits at the convention.

NEW REMA MEMBER

Revere Copper & Brass, Inc., Rome, N. Y., has become a member of the Refrigeration Equipment Manufacturers Association, it was announced at the recent meeting of Rema officers and committee chairman in Chicago.

Sterling F. Smith, manager of the commercial refrigeration division of Mills Industries, Inc., was named to the membership committee of the organization.

A request was received from Refrigeration Service Engineers' Society for cooperation in its efforts to develop additional servicing information on both old and new models. It also was suggested that manufacturers' design engineers meet with service engineers occasionally to discuss changes which might assist in easier maintenance of equipment.

MANPOWER BOOKLET

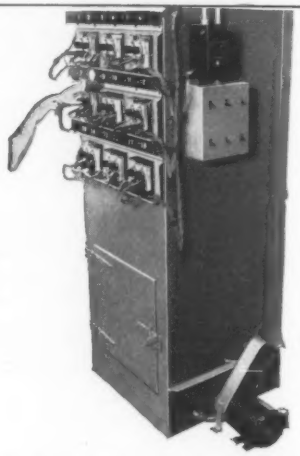
A second edition of its "National Refrigeration Manpower Program" booklet has been issued by the National Refrigeration Service Council as an aid in the establishment of local Service Councils in those communities which do not now have such an organization.

The booklet outlines the organization of both national and local councils, the operation of the local manpower program, and related activities such as deferments, wages and prices, and procurement of supplies. An appendix includes a general discussion of the Refrigeration Manpower Program, an outline of the standard training course, a suggested constitution for local councils, and a directory of Federal Agencies dealing with manpower problems.

The booklet is not available to individuals, but will be sent to groups

HERE IS YOUR ASSURANCE OF ACCURACY

Careful calibration of White-Rodgers Controls is one more reason for their accurate performance.



8 EXCLUSIVE FEATURES OF WHITE-RODGERS HYDRAULIC-ACTION TEMPERATURE CONTROLS

1. May be mounted at any angle or position, above, below or on level with control point.
2. Hydraulic-Action Principle incorporating solid-liquid filled bulb and capillary provides expansion force comparable to that of a metal bar.
3. Diaphragm motion uniform per degree of temperature change.
4. Power of solid-liquid charge permits unusually sturdy switch construction resulting in positive contact closure.
5. Heavier, longer-wearing parts are possible because of unlimited power.
6. Dials are evenly and accurately calibrated over their entire range because of straight-line expansion.
7. Controls with remote bulb and capillary are not sensitive to change in room temperature. Accuracy of control is not affected by temperature changes in surrounding area.
8. Not affected by atmospheric pressure. Works accurately at sea level or in the stratosphere without compensation or adjustment.

As a final test to insure the accurate performance of White-Rodgers products, each control is carefully checked under actual working conditions. For example, the fan and limit controls shown here are being adjusted while installed on equipment simulating actual furnace conditions. Thus accurate calibration and positive differential setting is assured.

These tests, and others like them, have been designed to provide accurate temperature control for you and to make the name White-Rodgers synonymous with *dependability* in the control field.

HYDRAULIC ACTION CONTROL

Fuel-Saving Starts With CONTROL

WHITE-RODGERS ELECTRIC CO.

1225J Cass Ave. St. Louis, Mo.

Controls for Refrigeration • Heating • Air Conditioning

interested in organizing councils in areas where none exist at present. Inquiries should be directed to W. Ray Kromer, National Manpower and Training Director, 1835 E. 24th St., Cleveland, Ohio.

BIG VOLUME EXPECTED IN HOME FREEZERS

Dollar volume from the sale of home freezers may equal, perhaps exceed, sales figures of electric ranges and refrigerators within a few years after the war, retailers attending the recent Chicago Home Furnishings Market were told.

It probably will take approximately two years after peacetime production is resumed to fill the pent-up demand for electric refrigerators and ranges, Vale E. Freeland, director of department and furniture store sales for the Westinghouse Electric Appliance Division, stated. Under those conditions, a retailer can sell as many of these items as he can get.

Retailers must plan now on how to merchandise the new electric appliances so they may receive their share of this new business, Mr. Freeland said. Grocery departments of department stores should prove a good market for frozen foods, and sale of home freezer cabinets can be coordinated in the grocery and appliance sections of these stores.

Many large department stores plan to open frozen food departments, Mr. Freeland said, to supply customers with exotic, cooked frozen foods from all parts of the world. Customers will shop for the kind of dinner they might order at restaurants in Quebec or New Orleans, Rio or Bombay.

CHANGE OF NAME

Mercier & Clark, Inc., Detroit refrigeration servicing firm, has announced a change in name to Mercier & Spalding, Inc., and a change in business location from 6523 Grand River Ave. to 12027-31 Hamilton Ave. Partners in the organization are W. F. Mercier, T. A. Spalding, and R. T. Spalding.

At its new location, the firm will occupy a one-floor layout of approximately 4500 sq. ft. floor space, and will have complete facilities for servicing all types of refrigeration and air condition equipment. The additional space also will allow room for the company's post-war selling department, which will include household and commercial refrigeration and air conditioning equipment, home freezers, and other appliances.

"E" AWARDS TO THREE

Three manufacturers in the refrigeration field recently were awarded the Army-Navy "E" for outstanding records in war production. They were: Kold-Hold Mfg. Co., Lansing, Mich.; American Central Mfg. Corp., Connersville, Ind.; and Handy & Harman, Bridgeport, Conn.

The award to Kold-Hold was in recognition of its production of low temperature equipment which made possible the testing of vital parts for the high-flying B-29 "Super-Fortress", and equipment for field refrigeration, refrigerated trucks, industrial equipment for freezing aluminum rivets and spars for aircraft construction, and sub-zero equipment for making expansion fits of mechanical elements, for testing radar, shells, rockets, guns, and other products.

American Central, peacetime producer of refrigerator parts, is now making jeep and trailer bodies, wing sections for bombers, collector rings for plane engines, carburetor air ducts, and related aircraft parts.

NIBCO WROT Fittings are formed in one step from straight copper tubing. They are strong, light in weight and dense in structure . . . impervious to gases. Because every fitting is perfectly formed and absolutely "round and square," they are easier to use in production. Laboratory Control and individual plug testing assure close tolerances. You can eliminate service troubles by using vibration-proof and corrosion-proof NIBCO WROT Fittings. Write for complete catalog.

NORTHERN INDIANA BRASS CO.
ELKHART, INDIANA
VALVES AND FITTINGS SINCE 1904

Conservation of Fr

Here's how—by following a few simple practices in handling refrigerant servicing equipment—you can help to compensate for existing short

By R. J. Thompson
Kinetic Chemicals, Inc.

MORE "Freon-12" fluorine refrigerant is being made today than ever before. However, defense needs are taking a large percentage of it, but production has been and is being expanded at this time.

Originally, all production was concentrated in one plant at Carney's Point, N. J., which was capable of making 2,000,000 pounds per month. On March 3 another plant was brought into production at Carney's Point, and the total production of these two plants is 3,500,000 pounds monthly. There is building at East Chicago, Ind., a plant which will have a capacity of 2,000,000 pounds monthly, but this plant will not be ready to operate before August 15. The total capacity of 5,500,000 pounds monthly is sufficient to cover all war needs forecasted so far and all peace-time needs, including comfort-cooling air conditioning. However, this amount of material may not be made available for air conditioning systems until possibly the latter part of this year.

"Freon-12" is used on ships of the United States Navy and the U. S. Maritime Commission for preserving foodstuffs. It is also used in Army camps, and in mobile refrigeration machinery which is pushed right up behind the Armies in their forward thrusts toward the enemy. The greatest single use at the present time of this refrigerant is in making aerosol insecticide, through which malaria is kept under control in tropical areas.

Service engineers can help relieve the present situation, help the entire refrigeration industry, and, at the same time, build up customer acceptance of maintenance service that will carry over to normal times. Conservation of "Freon-12" can be made in the servicing of equipment and in its handling. If present waste and losses are eliminated, the savings will help compensate for existing shortages and make additional amounts available for new equipment that, in turn, means more business for the refrigeration service engineer.

Service instructions that have been followed for compressors and evaporators using other common refrigerants apply, with only certain minor exceptions, to equipment using "Freon-12". The following information will serve a timely purpose as a check-list for practices that will reduce waste and losses.

WHERE LOSSES OCCUR

There are five major causes of loss and waste of "Freon-12" refrigerant:

1. Leaks,
2. Overcharging systems,
3. Incomplete removal of refrigerant from the cylinders,
4. Purging refrigerant into the air,
5. Making and breaking charging connections.

By following the directions given in this article for handling refrigerant and servicing equipment, highly important savings can be made.

TRANSFER METHODS

Emptying Cylinders:

The following detailed procedure is laid out to make sure of obtaining the full net weight of "Freon-12" from a cylinder. These instructions are based upon the proper method for weighing a 145-pound cylinder, emptying the cylinder of liquid refrigerant, evacuating the cylinder of refrigerant vapor, liquefying the refrigerant vapor, and reweighing the cylinder to obtain tare weight and establish net weight.

1. Place the filled cylinder on scales and then connect a line to the valve.

2. Weigh the cylinder, including the valve hood, to obtain gross weight.

3. Place the cylinder in a bucket or barrel of hot water, the temperature of which must not exceed 125°F.,

to increase the pressure of the refrigerant within the cylinder. After heating, remove the cylinder from the hot bath. Invert the cylinder, open the valve and discharge all liquid refrigerant. Never subject a cylinder containing compressed gas to a temperature above 125°F. (For "Freon-12", 168 pounds per square inch.) Do not permit a direct flame to come into contact with a compressed gas cylinder or fuse plug.

4. After all liquid refrigerant has been discharged from the cylinder, evacuate the cylinder to 28 to 29 inches of mercury for a period of 20 to 30 minutes by means of a refrigerating compressor. The vapor removed during the evacuation is to be compressed, condensed and the liquefied refrigerant discharged into the liquid line to your storage container or charging stand.

The complete evacuation of cylinders is important. The waste in the form of vapor, occurring in a 145-pound cylinder under various pressures, at a temperature of 125°F. maximum, is shown in the following table:

ON...

Pressure Lb. / sq. in. Gauge	Pounds "Freon-12" Vapor	Waste or Loss %
168.4	8.8	6.1
150	7.6	5.2
125	6.2	4.3
100	4.9	3.4
75	3.7	2.5
50	2.6	1.8
25	1.6	1.1
0	0.6	0.4
28" to 29"	0.0	0.0

LOSS...

5. After the cylinder has been completely evacuated, as outlined in operation No. 4, close the valve tightly.

6. Weigh the cylinder, including the valve hood, to obtain tare weight.

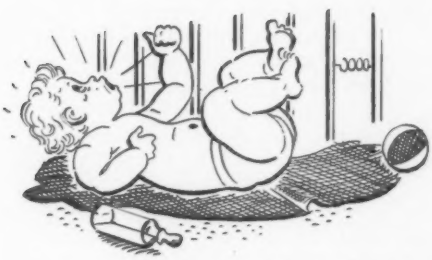
7. From gross weight obtained in operation No. 2, subtract the tare weight found in operation No. 6 to obtain the net weight of refrigerant removed from the cylinder.

8. Compare net weight found in operation No. 7 with the net weight shown in Column 6 of the analyses report which accompanies each shipment. This net weight should be 145, 25, 10, or 4, depending upon the capacity of the cylinder. When the net weight of refrigerant removed from the cylinder does not equal the prescribed capacity, there has been incomplete evacuation.

9. After making certain that all liquid and vapor has been removed from the cylinder, and the proper weights obtained, disconnect the line and remove the empty cylinder from the scales.

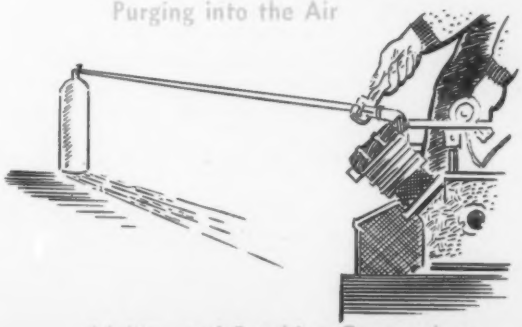
Leaks

Overcharging Systems



Incomplete Removal from Cylinder

Purging into the Air



Making and Breaking Connections

GENERAL PRECAUTIONS
When you handle Refrigerants

1. In warming the cylinder to promote more rapid discharge, extreme care should be taken to prevent a temperature above 125°F., as the fusible plugs in the cylinder and valve have a melting point of 157°F., and soften at a lower temperature. Never permit live steam to blow on the cylinders or the fusible plug safety devices, and never apply a direct flame against a cylinder or valve.

2. Every precaution should be taken to avoid drawing liquid refrigerant or oil into a cylinder when discharging the cylinder contents. The valve should be closed immediately after the cylinder has been emptied.

3. As soon as the cylinder is emptied of refrigerant, valve closed and cylinder disconnected from the system, the brass protection cap should be placed on the outlet connection of the valve so as to prevent dirt entering the valve and also to prevent damage to the threads on the valve connection. Cylinder hoods should be carefully screwed in place on the cylinder after use and before placing cylinder in stock or returning to manufacturer.

4. Should it become necessary to withdraw "Freon-12" from a refrigerating system into cylinders, care should be taken to avoid over-charging such cylinders. Only empty cylinders should be used for this purpose. In order to insure that they are empty, the valves should be opened and left open for 5 minutes prior to attaching them to the system which is to be emptied. The cylinder should then be placed on a scale, and its tare weight noted. It is then ready to be connecetd to the system, but should be weighed from time to time, so that the prescribed capacity of the cylinder is not exceeded.

   When cylinders are used to withdraw the gas from a system, Kinetic Chemicals, Inc., should be advised and at the same time be given the serial number of the cylinder so that the particular cylinder, upon arrival at the filling plant, may be promptly examined and cleaned before charging with pure gas.

5. Store cylinders upright and in a cool, dry place whenever possible. Keep cylinders away from salt or other corrosive chemicals or fumes, as rusting will cause damage to the cylinders and the cylinder hoods to stick.
   Never use "Freon-12" cylinders for rollers, supports, or for any purpose other than to carry "Freon-12".

6. Weigh the cylinder, including the valve hood, to obtain tare weight.

7. Do not force connections that do not fit. Make sure that the threads are the same as those on the cylinder valve outlet.

8. Do not tamper with the safety devices in the valve or cylinder.

9. Open the cylinder valve slowly. Never use any wrenches or tools except those approved by compressed gas manufacturers. Do not hammer the valve stem in attempting to open or close the valve.

10. Be careful to protect cylinders from cuts or abrasions in the surface of the metal.

11. When in doubt about the proper handling of a compressed gas cylinder or its contents, consult the manufacturer of the gas.

Charging:

The liquid line from the cylinder to the charging stand or unit, threaded connections or fittings, and all valve stem packing should be very carefully checked for leaks, and any leaks eliminated or reduced to an absolute minimum. If this is not done, the losses due to such leaks may be rather high, depending on the type of connection, temperature, pressure and time factors. A silver solder or soft solder connections are preferable wherever possible, rather than a threaded connection. The pounds or percent loss from a line or valve may vary considerably, but it should not exceed ½ pound in a 145-pound cylinder, or 35% of the net contents of any cylinder.

When making or breaking liquid line connections between the cylinder and the charging stand, the loss may vary from approximately 1 to 2 ounces per average household unit being charged, or 6½ to 7 pounds (4.5 to 5%) per cylinder. By using very short connections between the valve on the cylinder and the charging stand or unit, this loss should not exceed ½ ounce per unit charged, or 3½ pounds (2.5%) per cylinder.

Over-Charging:

Assuming an average charge per unit of 20 ounces of "Freon-12" and the tendency of the service engineer to go from ½ to 1 ounce over the required amount, an apparent loss due to over-charging may account for 3½ pounds or 2.5% per 145-pound cylinder. By holding the charging limit to zero and plus ¼ ounce per unit, the apparent loss should be of the order of one pound per cylinder, or 0.7%.

LEAK DETECTION

Due to the fact that "Freon-12" is stable and inert, the usual visible method called the "smoke" test cannot be used to determine leaks, as no known chemical compound reacts with the refrigerant to produce a visible vapor.

The best known method of detecting and locating a leak of "Freon-12" is by means of an alcohol or gas burning Halide lamp or torch. Due to the combustion of the fuel in the burner, a draft of from two to three feet per second is created through a steel tube which is inserted in the burner at the base of the flame. A flexible hose is placed on the end of the steel tube and the open end of the rubber-exploring hose is then passed around all possible sources of leaks. Any air suspected of containing "Freon-12" vapor is conducted through the hose and tube into the burner and over hot metallic copper. Should there be any vapor in the air being tested, the high temperature flame will cause the refrigerant to break down and form volatile copper halides. This will cause the flame color to change from the normal colorless to a bright green if the air contains as much as .01% of "Freon-12". Such a leak would be equivalent to the escape of one ounce of liquid refrigerant per month, or three-quarters of a pound per year.

Much time can be saved in locating leaks of "Freon-12" by looking for an accumulation of lubricating oil which has leaked from the system. Oil will be found where a leak occurs, as the oil is miscible with the refrigerant and will leak with it. Use the Halide lamp to positively locate the leak near the place where oil is found.

The use of a Halide lamp is the easiest and best method of positively determining the most minute leaks of non-flammable organic refrigerants containing fluorine, and the response to the test is instantaneous. In dark or confined locations, the use of a Halide lamp is obviously the only practical method of leak detection. Sensitivity of lamp may be increased by ventilating the room in which test for leak is being made.

Before using a Halide lamp or torch, make certain that no methyl chloride or other flammable gas has been added to the system and leaked into the room. Inquire whether or not a refrigerant other than "Freon-12" has been added. This precaution *must* be taken to protect you against fire and explosion.

The use of soap and water, odorants, or chemicals to produce reactions for a "smoke" test is not recommended.

Shutting Down Systems:

Many users of air conditioning have their system shut down for the cold months. The refrigeration service engineer should make it a point to check up on restaurants, theaters, hotels, and other establishments that follow this practice.

In shutting down a system, "pump down" the refrigerant into the receiver, and close the valves so as to retain the refrigerant until required. Make certain that the receiver capacity is sufficient to hold the entire charge, and also allows for a 10% void or gas space to take care of expansion of liquid under higher temperatures, and to eliminate the possibility of hydrostatic pressure bursting the receiver.

Check the valves after "pumping down," to make sure that there will be no leaks during the shut-down period.

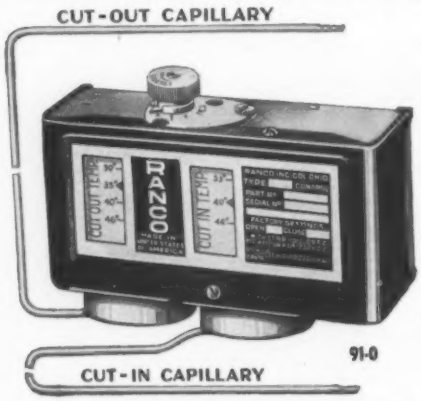
Purging Systems:

When purging a system of non-condensible gases, slowly purge only those gases and not the "Freon-12." Check for presence of "Freon-12" vapor by means of a Halide lamp.

THIS CHART WILL HELP YOU SAVE— HANG IT IN A HANDY PLACE

This article has been prepared as a helpful guide. It does not attempt to take the place of sound practical experience and available literature in covering the procedures designed to minimize losses of refrigerant and to insure safety.

"Joe Really Believes In Working Close with His Ranco Jobber"



The Ranco Type 91-0 Commercial Control with exclusive interlocking two-temperature control assures uniform fixture temperatures, uniform high relative humidity and complete automatic defrosting of the coil regardless of weather or load conditions or a cold location of the compressor. Ask your jobber about this and other Ranco Commercial and Domestic Controls.

WE don't expect you to take this picture literally, but what we do want to emphasize is this: *Cooperate closely with your Ranco Jobber.* There are many ways he can help you. Perhaps the exact Ranco Replacement Control you want is unavailable at this time. When he must recommend a substitute, accept it cheerfully and confidently, for he will recommend one that is easily adaptable. And rest assured that any Ranco Control he suggests is a precision instrument, sturdily made, dependable and accurate in operation.

COOPERATE WITH YOUR RANCO JOBBER

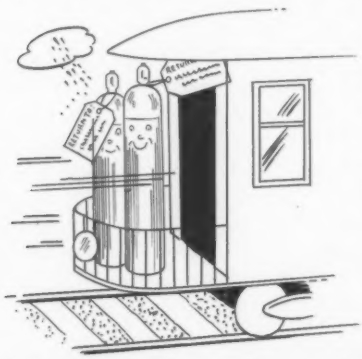
Ranco Inc.

COLUMBUS 1, OHIO

THE SERVICE MAN'S DEPARTMENT

A No. 1 Bottleneck. There is no shortage of sulphur dioxide and methyl chloride. However, it is true that shortages will occur if empty cylinders are not returned promptly to the manufacturers of these refrigerants. Jobbers throughout the country have cooperated fully in carrying out the program of "Sending Cylinders Home" as soon as they are empty, but the full benefit of the program cannot be realized unless the service man participates, as he is the ultimate consumer of these products and in most cases has the empty cylinders in his possession.

The war program has made it impossible for the manufacturers to obtain new cylinders, as they would have in pre-war days when drum shortages occurred. It is quite likely that this program of keeping cylin-



ders rolling will have to be carried along for a considerable period after the war is over, as there will be terrific demands in other directions for steel production and manufacturing facilities.

We are assured of prompt deliveries on these refrigerants if we keep the empty cylinders going back to be refilled. Let's help the other fellow get his refrigerant by returning our empty cylinders now.

This section of
The Refrigeration Industry
is edited by
Warren W. Farr
Refrigeration Maintenance Corporation, Cleveland, Ohio

Service Tip. Most common method of soldering old soft solder joints is to melt the old solder with a torch and wipe it with a rag or acid brush, in order to remove the old solder from around the joint. In so doing, a great portion of the dirt and corrosion that has accumulated on the outer surface of the old joint is forced down around the surfaces where the new solder is to be applied.

A better method of doing this job is to heat the old solder in the customary manner, usually with a gas torch, and when it reaches the molten state it can be entirely removed by directing a stream of compressed air through an air nozzle. All of the old solder and corrosion is entirely removed by this method, and the surface that is to be re-soldered is left clean and tinned, ready to receive a new application of solder.

This new method of cleaning solder joints is much faster than the old method commonly used, and enables the operator to clean in areas that are partly concealed, and which were almost impossible to clean by the method previously used.

There are, however, several precautions that must be exercised in using compressed air to remove molten solder. They are:

1. The operator must protect his eyes with clear goggles, to prevent any molten metal from reaching that area of his face.

2. The operator must be provided with a heavy piece of asbestos paper on which he can accumulate the molten solder as it is blown from the old joint. Use of this asbestos pad will permit the operator to catch the old solder a few inches away from the joint that is being cleaned, and alleviate the danger of scattering this hot metal over a wide area. A portable asbestos pad is preferable to a rigid baffle arrangement, as it is usually more desirable to move this pad as the stream of compressed air is directed in different directions, than it would be to move the hot work into a position where a rigid baffle would catch the molten metal.

While this method is most easily applied to low melting solders, it can very readily be applied to almost all solders, including the high temperature silver solders, the only difference being that a much higher flame temperature must be used in order to make them flow freely when air is applied.

—o—

"Sense-ative" Service. A service man's senses can often readily diagnose the trouble at hand. An interesting letter recently received from Mr. Greenberg of Brooklyn, N. Y. illustrates some of the manners in which a service man's senses are helpful. Says he:

"A service man could use his sense of touch, hearing, and sight to locate service troubles in a hurry.

"For instance, if the liquid line is considerably warmer than usual, it may be due to the fact that the line is filled with gas, rather than liquid, due to a shortage of refrigerant in the system, or the condenser may be faulty.

"If the liquid line is too cool, you may have a restriction in the tubing or a partially closed valve.

"A frosted suction line will indicate an excess of refrigerant in the system.

"On a belt-driven job, if the condenser-receiver is warm at the bottom, you might have a shortage of refrigerant, or, if it is very hot, air in the system. A shortage of oil may show up in a very warm compressor base.

"A hissing noise in the expansion valve will indicate a shortage of refrigerant.

"If the line coming from the discharge shut-off valve is cool, the discharge valve may be leaking. Signs of oil at any part of the system may be signs of a leak.

"Excessive sparking may be caused by a rough commutator on the motor.

"This is an idea of how the service man could use his 'senses' to do a better job."

Most of Mr. Greenberg's ideas are well taken. However, his statement on a frosted suction line indicating excessive refrigerant in the system does not hold true in most cases. With either a capillary tube or a high side float, excessive refrigerant will frost the suction line, but when low side floats or expansion valves (either automatic or thermostatic) are used as the metering device, a frosted suction line will have no bearing on the refrigerant charge. Rather, it will indicate a poor adjustment of the device, or leaky needle assemblies.

Also, his statement on a hissing noise in the expansion valve indicating a shortage of refrigerant should be amended to include the possibility of a restriction in the receiver or liquid line, and any drier or filter that may be installed in the liquid line.

———o———

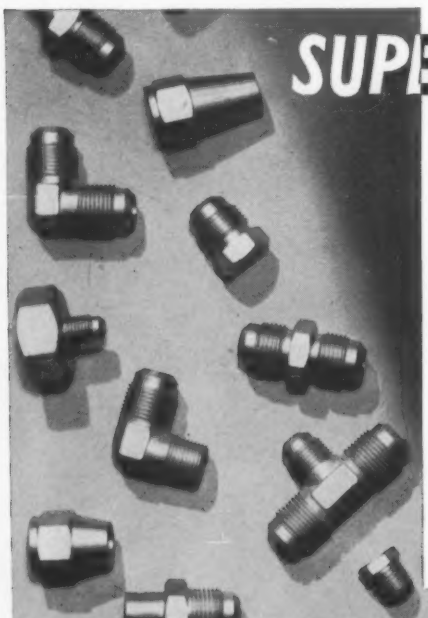
Flow Meter. Most service shops can use a flow meter to advantage in their compressor rebuilding operation, to check volumetric efficiency of rebuilt compressors. A standard gas meter of rather small capacity that has a one or two cubic-foot calibration serves very well in the capacity of a flow meter. It is accurate, and can be readily adapted to this service, by connecting the outlet of the gas meter to the suction manifold of the compressor.

Connected in this manner, it will record the number of cubic feet of air pumped by the compressor. The inlet side of the gas meter should be left open to the atmosphere, and unrestricted. Tubing sizes used in making the connections should be of ample size to eliminate any pressure drop through the connections. Readings should be taken for a specific length of time, usually one minute.

———o———

More About Manpower. In critical labor areas, the U. S. Government has created an "employment stabilization plan" whereby all male workers over the age of 17 must be procured from or referred through the U. S. Employment Service.

Under this plan, a worker is placed with the employer who has the highest "priority rating." Form 63 has been designated for use by employers in applying for a priority rating. In communities where organized groups of refrigeration employers have been active, good results have been obtained this industry high up on the priority list. For example, in Washington, D. C., over 25 repair establishments have been granted hiring



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All threads machined to medium fit (SAE Class 3). Flare threads and faces protected by cardboard ferrules.

SUPERIOR QUALITY FITTINGS are recommended for, and used extensively by refrigeration, machine tool, marine, refining, liquefied petroleum gas, and many other industries.

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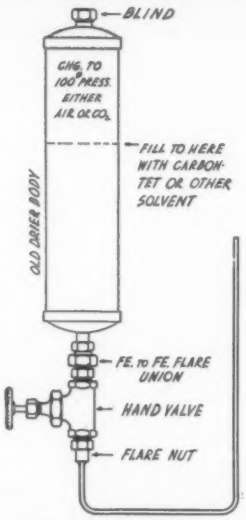
priority ratings and increases in employment ceilings.

These ratings, most of them in groups 4 and 5, will permit the referral of experienced mechanics, apprentices, or trainees to refrigeration repair agencies, either for the replacement of men lost since employment ceilings were established, or where justifiable, to increase their present personnel.

In order to make sure that repair agencies can hire men when they need them, they should file Form 63 immediately, and receive their rating.

I do it this way...


BLIND
CHG. TO 100# PRESS. EITHER AIR OR CO_2
FILL TO HERE WITH CARBON-TET OR OTHER SOLVENT
OLD DRIER BODY
FE. to FE. FLARE UNION
HAND VALVE
FLARE NUT

CONDENSER CLEANING GUN

Here is a sketch of an easily made tool, most of the parts for which can be picked up out of a junk barrel.

A large drier body, a hand valve, a union, a flare nut, and a short piece of small diameter tubing will make a condenser cleaning gun that will get at those grease- and fuzz-clogged condensers and clean them out in a short time with a minimum of muss or fuss.

Just assemble it as shown. With valve end up, fill three-quarters full with carbon tetrachloride, then hook to air or pressure-reduced CO_2 line and charge to 100 lbs. or so. When using, hold valve in down position and direct stream wherever needed with the small diameter tube.

R. W. Brackeen, Kansas City, Mo.

Where is the finest SULFUR DIOXIDE and METHYL CHLORIDE usually found?
In cylinders marked ANSUL*
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ORDERS FILLED PROMPTLY through your Ansul Jobber.
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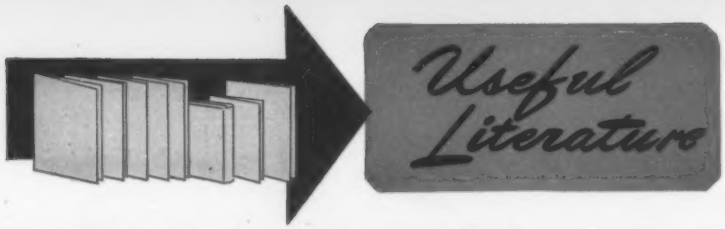

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40—Brazing . . . A four-page bulletin detailing the various uses of its silver brazing alloys, Sil-Fos, Easy-Flo, and Easy-Flo No. 3 in the marine field. Released by Handy & Harman.

41—Refrigerants . . . Two booklets (No. 36 and No. 47) and a bulletin (Form 2621) containing a compilation of data on "Tabulated Properties of Various Refrigerants" and "Refrigerant and Lubricant Data for Refrigerating Equipment", providing convenient reference material on all refrigerants in common use, and listing refrigerants used, refrigerant capacities, amount of oil in system, and motor hp. of household units from 1934 through 1937. Bulletin covers methods of transferring refrigerants from large to small cylinders. Issued by Virginia Smelting Co.

42—Catalog . . . A twelve-page catalog, illustrated and describing its line of packless and packed valves, strainers, dryers, and other accessories for air conditioning and refrigeration. (No. 96). Issued by Henry Valve Co.

43—Fan Blades . . . A revised catalog listing its complete line of fan blades, and containing complete NEMA and NAFM performance ratings for them. Several new sizes of propeller fan blades are listed. Issued by Torrington Mfg. Co.

44—Production for War . . . A booklet describing its all-out effort for war production, telling a word and picture story of how plant production was increased and how its products are contributing to victory. Issued by Worthington Pump & Machinery Corp.

45—Wall Chart . . . A wall chart issued by Dayton Rubber Mfg. Co., outlining data on its line of v-belts and giving information on lengthening belt life.

46—Controls . . . a catalog illustrating and describing its complete line of control equipment for pressure, temperature, and flow. (No. 52). Issued by General Controls.

47—Water Coolers . . . A catalog describing its line of water-cooling equipment for plant cafeterias, mess halls, bakeries, hospitals, bottlers, both remote and cabinet type. Issued by Filtrine Mfg. Co.

48—Plastic Tape . . . Literature describing "Fibron," a new many-purpose plastic tape for insulating wires and cables, and for protecting wiring, piping, etc. from oil, grease, acids, and moisture. Sample for testing also available. Issued by Irvington Varnish & Insulator Co.

49—Oil Separators . . . Bulletins describing the uses of oil separators in both commercial and industrial applications from 1/3 hp. to 120 tons. Issued by American Injector Co.

50—Float Controls . . . Information on the use of Phillips float controls for flooded systems, in bulletin form. Issued by H. A. Phillips Co.

51—Hose Clamps . . . A circular illustrating and describing "Aero-Seal" hose clamps for use in refrigeration. Issued by Aircraft Standard Parts Co.

52—Coil Cleaner . . . a four-page folder briefly describing properties of and uses for "Clean-A-Coil" solvent for removing crust from cooling and heating coils. Issued by Standard Solvent Co.

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9-44

ACCOUNTING . . .
Continued from page 19

accurate bookwork, maximum cost control, and a true picture of profit or loss. Modern accounting is a far cry from the single-entry ledger of cracker-barrel days, but so is the airplane compared to the surrey with the fringe on top.

Above all, keep in mind the fact that materials and manpower shortages, government regulations, and an economic upheaval are distorting normal business operations, and stability may be a long way off. New products coming into the field, untested markets, new merchandising and servicing equipment, revolutionary developments of one kind or another, the transition of wartime production to peacetime pursuits, and many other complexities will require considerable experimenting and detailed cost analysis to determine whether selling prices are right for profitable volume.

Now is the time to overhaul your accounting system to see whether it accurately reflects income and outgo, so that for the remainder of the duration and in the postwar period, you can compute your spendable profit with precision, estimate the correct tax on income, and build up dependable check-figures for use in making estimates and setting flat prices on service, as well as for comparison with actual job costs.

Recently a refrigeration serviceman informed us that he had a wonderful system, had used it for years. "It was installed by my father before I took over the business." But the days of his Dad were days of a simpler economy, when business knew fewer gremlins.

An antiquated bookkeeping system, even a revered heirloom, needs overhauling today—and this goes whether you run a one-man business from your home or operate a showroom with a service shop. Resolve now to keep accurate accounts, to scrap or modernize your old accounting routine, so that when the postwar period arrives, you will have it in good working order and can use it, not only as a means to determine profit or loss, but as a guide to profitable operation and better cost control in the future.

"The Record is...Trouble-Free"..."The Record is...Trouble-Free"..."The Record is...Trouble-Free"..."

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Automatic control and regulating valves for Freon, Methyl Chloride and Ammonia. A large variety of sizes and types available for practically any refrigeration requirement.

WL water regulating valves for Freon, Methyl, or Sulphur. 5/16" orifice and 3/8" FPT. Brass body construction. Large capacity—no chatter.

WP water regulating valves are available in 3/8", 1/2" and 3/4" FPT sizes. Brass body construction for Freon, Methyl or Sulphur. Easy adjustment.

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Electrimatic valves are individually tested for efficient, economical operation. Trouble free performance.

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CHICAGO 16, ILL.

Over the COUNTER

Some reasons why a chill room won't run in August like it did in May.

FRANK: Boy! "Information Please" may be off the air for the summer, but they don't call any vacations on the brain-teasers we got around here, do they? Pete just handed me one that really sent me back to the books for the right dope. Kinda put me on my mettle, too—'cause I had some competition.

JIM: Competition? I don't get it.

FRANK: Yeah—Pete gave the same set of figures to some other "experts," he said, and it sort of stumped them. So I had to check things out pretty well before I could call it quits. Here's what he was up against:

He's got a meat chilling room in a packing plant, with a capacity of 2,000 to 5,000 lbs., that's charged with dressed meat 3 or 4 times a week. The meat's usually high outside over night to cool down, and the doors aren't opened very often between loadings. He says the insulation's equal to 4 inches of cork.

He's got a 2-horse methyl chloride air-cooled compressor on the job, in average or better location —not in the basement—and a couple of coils rated at 9900 BTU's per hour at 15°, set up in diagonal corners of the room. Bottoms of the coils are 8 feet above the floor, he says, so air flow isn't obstructed by hanging carcasses. One coil's about 35 feet from the unit, the other's about 10 feet away.

JIM: O. K., that sets up the job. So what's his trouble?

FRANK: Well, when he started up the job in May, he only had one coil to use, and the job ran O. K., holding 38 to 40° in the room, with "on" and "off" time about right for the compressor. To get this, though, he had to do considerable adjusting on the expansion valve—and when he put the second coil on a few weeks later he couldn't get either one or both to operate right, even after trying all the usual adjustments like changing the feeler bulb, checking refrigerant, and that sort of thing.

When the valve was opened enough to completely refrigerate the coil, suction pressure was 15 to 17 lbs., and in hot weather head pressure ran from 175 to 180 lbs.

JIM: Man, that's 'way too high for comfort!

FRANK: You said it—that was the most disturbing part of the problem, to me. Anyway, Pete says the compressor ran too much, and the coil frosted up to within a turn or two of the top, and once temperature went down to 32 degrees in the

room. He says he's never been able to operate the job with suction pressure under about 15 lbs.—the coil would simply frost up and the compressor run continuously. He said he had to open both valves several turns, because the factory setting wouldn't allow enough gas to allow the compressor to run.

Finally he put on a different size valve on one coil, and the job started up at about 16 lbs. suction and ran O.K., although it did show some signs of frosting the coil. But he hasn't heard any more from the customer. Now he's running the job with one coil, and he still hasn't solved the head pressure problem.

JIM: I suppose the first thing you did to try to work out the problem was to size up the equipment to see if it fit the job.

FRANK: Yeah, and it looked to me like the equipment might be a little bit light, especially the condensing

unit. I figured that a 3-horse air-cooled unit or a 2-horse water-cooled unit might have furnished enough extra to carry the job over the hot weather hump.

I figured the load at between 17,900 and 23,600 BTU's, with the meat going into the cooler at about 70° and being cooled to 40, figuring 18-hour compressor operation and summer temperature of 80° or higher. With refrigerated room temperature at 40° and 15° temperature differential, we'd get an evaporating temperature of 25. And if the compressor operated at full capacity, say 18,200 BTU's, the gage reading of 17 lbs. suction pressure would be right. The coils at 19,800 BTU's are adequate to handle the compressor load as long as valve adjustment, feeler bulb location, and other factors are right.

JIM: So you figure that with those load figures, the job would get by under normal weather conditions, but higher temperatures and heavier load would be too much for the job. That was why he got good results in May with one coil, and ran into trouble when the weather was warmer.

FRANK: What bothered me the most, though, was the high head pressure. With a 90° room temperature and 100 to 105° condensing temperature, gage pressure should read from 102 to 110 lbs. If the room was 105° and condensing temperature 120°, the gage shouldn't be over 140 lbs. So I said it looked to me like he had other troubles to look for.

JIM: Sure—that could be caused by the unit running continuously and not pulling down the temperature, or from air in the system or an over-charge of refrigerant, or copper plating from moisture.

FRANK: The most likely trouble, I told Pete, was air in the system. It probably happened when he installed the second coil. In direct-expansion jobs, the refrigerant at high velocities sprays through the coils and air has a way of getting pocketed in layers of refrigerant, finally getting to the compressor head and building up high pressures until you take time and get it all out of there. That means maybe 10 or 15 purgings, with about 15 minutes running time between each one, finally bringing the job down to 10 or 15 lbs. below operating pressure before you stop.

Then you add refrigerant until the pressure rises to the operating point. I've gone through this procedure more times than I can remember, and it almost always fixed up the jobs I had trouble with.

HOW DO YOU DO IT?

Do you have a simpler way—faster way—to do a job?

THE REFRIGERATION INDUSTRY pays $5.00 for each hint or kink published. Send them in—a simple drawing or photo helps the description.

THE REFRIGERATION INDUSTRY
812 Huron Road
Cleveland 15, Ohio

ECONOMICAL TO USE!

10 CENTS

. . . for each pound of refrigerant in the system. And no dilution-of-refrigerant worries.

Removes Moisture Chemically.

A TINY AMOUNT . . .
→ **A BIG JOB** ←
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CHECK DOOR GASKETS ON EVERY JOB!

Make a habit of checking door gaskets on every refrigerator you repair... you'll earn more money and do a better service job. Worn or deteriorated gaskets cause heat losses ranging up to 9% on a high percentage of used refrigerators, and cost the owners money.

Jarrow Gaskets for all popular makes of refrigerators conform to original specifications ...are recognized as the ideal gaskets for replacement.

Your Jobber Has Jarrows In Stock

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Why the Trend Is Strong to CHICAGO SEALS and VALVE PLATES

Chicago Seals and Valve Plates make a better servicing job on all refrigerators, in less time, at less cost, at more profit... and more service men and more jobbers are finding out this fact every day.

CHICAGO SEAL CO.

20 North Wacker Drive, Chicago 6, Ill.

E. W. MONTGOMERY

Earl W. Montgomery has been appointed zone manager for Lynch Mfg Co., Defiance, Ohio, in the southwestern states, with headquarters in Dallas. He comes to the company following eight years of successful experience in specialty distribution through automotive and specialty jobbers, during which time he became a zone manager for a leading manufacturer.

E. W. Montgomery

H. DALE COOK

H. Dale Cook has joined the controls division of Perfex Corp., Milwaukee, in a sales engineering capacity. For the past five years, Mr. Cook has been in the Chicago branch office of General Controls Co., Glendale, Calif., manufacturer. Previous he was associated with Minneapolis-Honeywell Regulator Co., and with Michigan Public Service Co.

L. D. RAMBEAU

Lawrence D. Rambeau has been appointed to the advertising and sales promotion staff of the Kelvinator division of Nash-Kelvinator Corp. He will be in charge of the company's program of sales training for the post-war period.

F. E. WALBRIDGE

F. E. Walbridge has been named supervisor of refrigeration control sales for the Cleveland zone of Minneapolis-Honeywell Regulator Co., covering Ohio, northern Kentucky, West Virginia, western Pennsylvania, western New York, and Michigan.

CLARK BRIDGMAN

Clark Bridgman, for the past nine years Chicago manager for The Bush Mfg. Co., has organized a new company under the name of Clark Bridgman Co. to handle the sale of Bush products in the midwest territory.

The new organization will cover northern Ohio, Michigan, Indiana, Missouri, Kansas, Illinois, Iowa, Wisconsin, Minnesota, North and South Dakota on Bush equipment. Main office will be in Chicago, where complete engineering and sales services will be available, with representatives at various points throughout the territory.

W. L. NAHIN

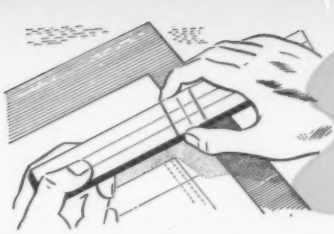
Wallace L. Nahin has been appointed general sales manager of the Vilter Mfg. Co., Milwaukee. Since 1940, he has been manager of the company's St. Louis office.

O. G. TINKEY

Otto G. Tinkey has been named manager of Penn Electric Switch Co.'s St. Louis branch office at 4030 Chouteau Ave. Before joining Penn, Mr. Tinkey was St. Louis representative for Copeland Refrigeration Corp., and consulting engineer for various St. Louis manufacturers.

E. L. WERNER

E. Lynn Werner has joined Deepfreeze Division, Motor Products Corp., North Chicago, Ill., as advertising manager. For the past seven years, he has been with United States Advertising Corp., Chicago.



New Products

Adjustable Hole Cutter

A new all-purpose adjustable hole-cutting tool has been announced by Bruno Tools, Beverly Hills, Calif. This new tool may be used for cutting holes in wood, steel, brass, hard rubber, aluminum, fiber, plastics, and other materials which normally would require use of torches or other expensive equipment, it is claimed.

Two sizes are available, each equipped with a high speed steel

blade. One model cuts holes to any diameter from $\frac{5}{8}$-inch to $1\frac{1}{4}$-inches through $\frac{1}{8}$-inch thickness. The other model covers all expansions from 1 to $2\frac{1}{2}$ inches through thicknesses up to $\frac{3}{8}$-inch. The tools are designed to operate in light drill presses, portable drills, or breast drills and also are available with square shanks for use in hand braces.

The hole cutter consists of a drill which starts the hole and also acts as a pilot for the tool, a hardened body with a milled slot into which is set a specially-ground high speed steel tool bit, and a hardened and ground shank. Adjustment is obtained by loosening the hexagon bolt which holds a firm locking clip, and sliding the blade to the correct distance from the pilot.

Thermoregulator

A low temperature, mercury-in-glass thermoregulator, known as the "Mercuthal Magna-Set," designed to control a well-agitated constant temperature bath of correct design to within 0.02 degrees C. of the temperature at which it has been set, has been developed by Precision Thermometer and Instrument Co., Philadelphia. This instrument is recommended for temperatures from —35 degrees C. to —50 degrees C. The company also manufactures a standard Magna-Set unit for higher temperatures up to 100 degrees C.

Welding Timer

Suitable for welding small objects of high conductivity such as aluminum or copper, a new precise welding timer with heat control for timing intervals of one-half cycle or less has been announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. It can be furnished as a separate control for use with existing small bench welders or in combination with a small welding transformer.

Consider the OSTRICH!

Poor bird. His idea of ducking problems is to bury his head, then what he can't see doesn't worry him. It's a fine idea—for ostriches. But it won't work for men who want to make real money in refrigeration. This is a business in which you have to have your eyes open, not only to see your way around today, but so you'll know what it's all about in the future.

U.E.I. BALANCED TRAINING

is a program of sound, practical home study matched with actual shop practice; designed to make good refrigeration men better; to make refrigeration men out of mechanically-minded laymen. It's an eye-opening program employing the method of Balanced *instruction that this school has used successfully for SEVENTEEN YEARS to help go-getters get where they wanted to go in refrigeration.*

If you're thinking about YOUR future in refrigeration (regardless of whether or not you're now in the field), MAIL the COUPON TODAY for FREE FACTS.

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-"SULFUR"
-"METHYL"
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Tested Purity for Service Surety

BUY WAR BONDS & STAMPS

AGENTS FOR KINETIC'S "FREON-12" and "FREON-22"
VIRGINIA SMELTING CO.
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kept in a low-humidity cabinet. The reason for this is that the rate of mold growth increases with humidity. This condition is partly offset by holding the food space at a lower temperature than has been the practice. The standard test temperature for household refrigerators used to 43½°F, but in the high-humidity type the average food space air temperature should be between 35 and 40°F.

Tests have shown that the mold growth which persists at these low temperatures can be stopped, or greatly retarded, by the use of germ-killing radiations. There are now germ-killing lamps available which produce radiations mainly within a narrow band quite close to the ideal wave length of 2537 Angstrom units. Now that we have means for retarding mold growth without drying out the food, it is possible to make the household refrigerator do a better job than was formerly done in cold storage plants, where humidity and temperature were regulated to fit the product stored long before we had household electric refrigerators.

AMINCO
OIL SEPARATORS

Aminco Oil Separators protect compressors by maintaining correct oil level in crankcase and by excluding oil from refrigerant stream they enable coils, condensers, valves and dehydrators to function most efficiently.
These oil separators are made for jobs from ⅛ H.P. to 120 tons and are used everywhere, ashore or afloat, where efficient refrigeration is desired.
Full descriptive bulletins on request.

AMERICAN INJECTOR CO.
1481 - 14th AVE. DETROIT 16, MICH.
Van D Clothier, 1915 E. 16th, Los Angeles
George Beone, Rm. 735, 1775 Broadway, New York
W. H. Cody, Santa Fe Bldg., Dallas
Export: Borg-Warner, 310 So. Mich., Chicago

A Place for Dry Foods:

Breakfast foods, crackers, and dried foods which do not need refrigeration kept nicely in the *dry* air of the pre-war refrigerator, but our post-war refrigerator with high humidity is not so good for them. Compartments held at room temperature or higher with very low humidity can be provided, but they should not be inside of the refrigerated space. This is an additional compartment, not a sub-compartment.

A Changed Ice Compartment:

This condition will be cured in part by the addition of a real frozen food compartment. The ladies have in the past been using the ice tray compartment to store frozen foods or freeze desserts for special occasions, which are also the very times at which they would like to have more than the usual supply of ice. The post-war refrigerator should separate the job of making ice from the job of freezing desserts or storing frozen foods. The production of ice should be automatic, and the ice should be ready for instant use without melting or prying it. The ice-maker should also eliminate levers and grids which are hard to wash.

Ice that is Free from Food Tastes:

This taste which the ice collects comes from food vapors which are carried into direct contact with the ice, where they condense and form part of the frost or top portion of each ice cube. There are two answers to this difficulty, one being to make and keep the ice in a compartment separated from foods. The other is to minimize the evaporation of foods by storing them in high-humidity air.

The Refrigerator Should Not Start So Often:

This does not mean that refrigerators now in use run too many hours out of the day, though the ladies sometimes say it that way. What they mean is that the frequent starts and stops are annoying. They get the impression that it is running all the time because they so frequently hear the start or the starting is noticeable in some other way, such as the blinking of lights or a click on the radio. What they want is a refrigerator that makes fewer starts and runs longer each time, with longer idle periods between runs. This can be accomplished by the addition of hold-over means which may be a small tank of eutectic mixture for the freezer or it may be a supply of ice or cold water for the main food space.

A Better Arrangement of Shelves:

One of the faults of pre-war refrigerators was that the manufacturers put the shelves 4¼" apart so as to claim the greatest possible number of square feet of shelf area under NEMA rules. The ladies are not interested in NEMA rules and would like to be able to use the shelves. When they remove one shelf entirely in order to make the shelf below it useful, they lose the theoretical square feet of shelf area which were advertised. Another reason for poorly-arranged shelves is that evaporators have been placed in the middle of the cabinet, allowing the use of a slightly smaller evaporator and slightly increasing the figure on net cubic feet of food space. In the ideal post-war refrigerator the evaporator will practically disappear from the main food space and the shelf for milk bottles be wide enough so that one bottle will pass another. There should be fewer little drawers and racks into which the food fits so nicely in the advertisements but never quite seems to fit in the kitchen.

Shelves that are Easier to Clean:

A wire shelf is not an easy thing to wash. There is plenty of chance for improvement in this as well as in the supports for the shelves, whether or not the shelves be of the sliding variety.

Smoother Hardware:

The elimination of such objectionable hardware and trim is in line with the other points mentioned above. A general cleaning up of design is in order to get rid of projections, sharp corners and dirt-catching crevices.

Fewer Ornaments and Cracks to Collect Dirt:

We have been in the habit of putting too much "trim" on refrigerators. This is partly the hardware and partly the "ornamental" ribs which are pressed into the outer shell of the

Continued on page 46

NATIONAL REFRIGERATION SUPPLY JOBBERS ASSOCIATION

AWARD

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To the
Manufacturer
Whose Policies, Product and
Promotion Are Considered
Most Outstanding

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DETROIT LUBRICATOR COMPANY
1943

To the National Refrigeration Supply Jobbers Association:

The management and employees of Detroit Lubricator Company gratefully thank you for this award and wish to express appreciation to all those whose cooperation has made it possible. This cup shall be a symbol—a constant reminder of the past—an ever present incentive for the future.

C. H. Hodges
President

DETROIT LUBRICATOR COMPANY

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Canadian Representatives: RAILWAY AND ENGINEERING SPECIALTIES LIMITED, MONTREAL, TORONTO, WINNIPEG

WATER COOLER . . .

Continued from page 17

all three motor terminals. If the lamp lights, a grounded motor winding is indicated.

(2) Using the test lamp, plug into a convenient outlet. Place the test points on red and black, black and white, and red and white. If the lamp does not light in each case, an open winding is indicated.

If the procedure followed as described above indicates that the motor is all right, the following methods will locate other electrical trouble:

(1) Thermal Overload Open.

Use test lamp with the terminals shorted. Plug in the unit service cord and close the temperature control switch. Place the test lamp points on the relay L and 2, then on L and M. If the lamp lights on the first position and not on the second, the thermal overload is open.

(2) Relay Contacts Stuck Closed.

Use the test lamp with the terminals shorted. Plug in cord, place test points on S and 3, and close the control switch. If test lamp lights for about five seconds, the relay contacts are stuck closed.

(3) Relay Contacts Fail to Close.

When the contacts are stuck open, the motor will not start if procedure in (2) above is followed, and lamp will not light.

(4) Start Relay Opening too Soon.

Follow procedure under (2) above. If the contacts of the relay are opening too soon, motor will fail to pick up load and stop. (This can be due to improper loading). The lamp will go out, current will flow through the thermal element, and overload will open. After a period of time the element will cool, allowing contacts to close, and the operation will begin again.

(5) Ground in Wiring.

Remove service plug, remove leads at compressor. Plug in test lamp, grounding test tip successively on each of the three motor leads. When lamp lights, a ground is indicated at that point. Reverse plug in socket and re-test. Lamp must light in both cases.

The service man should also check for broken wires, and for thermostat contacts that are open. When system failures have been determined on water coolers equipped with hermetically sealed systems, the complete cooler should be returned to the manufacturer for repair, since the system cannot be replaced in the field.

POSSIBLE FIELD REPAIRS

Important as it is for the service man to make sure that all hermetically sealed units in which failures have occurred are returned to the factory for repair, it is just as important for him to eliminate unnecessary returns of coolers of this type that have developed minor troubles which can be handled in the field.

The following are the most common causes for returning water coolers unnecessarily for factory repair, when equipped with hermetically sealed systems:

(1) Runs continuously with no refrigeration or cooling.

Correction: change relay.

(2) Will not run after shutting off.

Correction: change relay.

(3) Blowing of fuses. Cause: short in fan motor (where one is used). Best method of determining location of short circuit is to disconnect the three wires at the compressor and use test relay, to determine if the compressor will run. If compressor does run, the unit is not at fault.

Correction: change relay.

Correction: change fan motor.

There also are instances in which a broken bakelite case will allow the contact screws to cause a short circuit on the condensing unit frame.

Correction: change relay.

(4) Unit will not run.

Correction may be accomplished by checking to see if relay is wired correctly.

Simplest way to check any sealed unit, if there is a doubt as to unit or other failure, is to isolate compressor with test relay, and check to see if compressor will run. If compressor runs, replacing unit will not help correct complaint.

The service man also should check line voltage, to see if this is correct. Other causes for failure of the unit could be a broken small diameter liquid line (capillary tube), which replaces the expansion valve where sealed units are used in water cooling. Also, the unit may lack proper charge of refrigerant. In both instances, the water coolers in question should be returned to the manufacturer for repair.

OPEN TYPE UNITS

On water coolers using open type condensing units, some of the common complaints and suggested corrections are as follows:

(1) Drippage or condensation caused by frosting on open type units. A quick check to determine if the expansion valve is set too low, or if the system lacks refrigerant, will correct a large percentage of complaints of this nature.

Also reported frequently is the complaint that the motor runs constantly on open type units, and does not cool water. In most cases, it has been found that all service valves were not opened prior to placing the cooler in operation. This is quickly corrected.

Complaints of inoperative bubbler valves, in which the proper flow of water is retarded by particles of dirt which have gotten into the valve, have been found to be caused, in many cases, by failure to flush the plumbing lines prior to installation of the water cooler. Where there is a screen inserted in the supply line to which the bubbler line is attached, this should be checked to determine whether it has become clogged with dirt, because this will cause the flow of water to be retarded. Complaints of this nature often have resulted in replacement of bubbler valves, without getting at the real seat of the trouble.

Complaints of stopped drains can be corrected by disconnecting the water cooler from the plumbing lines and applying air pressure of approximately 100 to 150 lbs. from the drain in the rear of the cooler cabinet through drain lines to top of the cooler. Such problems can readily be corrected in the field, especially in industrial plants in which air pressure is readily accessible, as well as in a well-equipped refrigeration servicing shop. To return such coolers to the factory unnecessarily results in loss of water cooler service to the user for from three to four weeks, to say nothing of the greater expense involved in such a procedure.

One particular over-all complaint received regarding water coolers is concerning a water leak, or so-called internal leak, in which both low side

Continued on page 42

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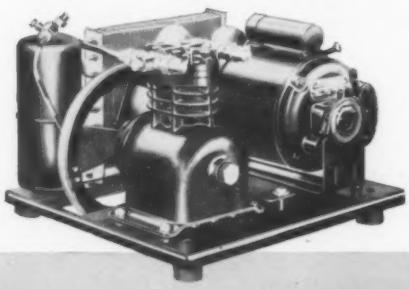
That's What COPELAND Offers Those Interested in Dependable Refrigeration

If you are looking for a definite answer to your present and peacetime refrigeration problems, Copeland has it. Your selection of Copeland units to handle your refrigeration jobs insures unexcelled performance and complete satisfaction.

No matter what your refrigeration problem may be, there is a Copeland unit so engineered and designed for you.

The COPELAND Line is Complete

- Open Type Commercial Condensing Units
- Copelametics (Field-Serviceable Hermetics)
- Electric Water Coolers
- Household Electric Refrigerators
- Refrigerator Replacement Units



With more than a quarter century of exclusive refrigeration experience, you can find no source better qualified than Copeland. Why not write us?

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DEPENDABLE *Electric* REFRIGERATION

★ *Buy Another WAR BOND Today!*

COPELAND REFRIGERATOR CORPORATION, SIDNEY, OHIO

WATER COOLER . . .

Continued from page 40

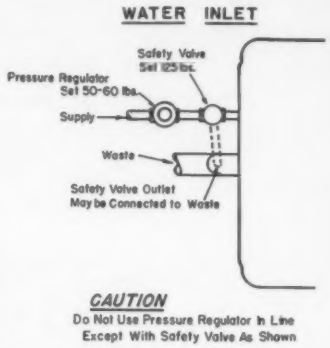
tank and refrigerant coil are leaking. In most such cases, field servicing of the equipment is not practical, and the cooler should be returned to the factory for repair.

COOLING TANK TROUBLE

A cracked, or bursted, low side cooling tank in most cases is caused by excessive incoming water pressure. The pressure is in excess of what the cooling tank can withstand. Complaints of this nature are most frequent in large office buildings throughout the country, where flush meters are used on wash rooms or lavatories, and where the water coolers are connected to these same lines. The reason for this is that the flush meters operate under a terrifically high pressure, which the water cooler is not able to withstand.

Since the average user is not at all familiar with the condition described above, he is inclined to blame the complaint on inferior manufacture. The corrective measure in this case is for the service man to install a pressure regulator set at 50 to 60 lbs. and a safety value, when incoming water pressure is in excess of 125 lbs.

In various so-called "hard water" areas throughout the country, electrolytic action on low side water cooling tanks has necessitated numerous replacements of these types of tanks. The service man can determine whether such replacements are required when the water valve is turned on, and the flow of water shows a mixture of water and refrigerant gas, with a blue or greenish tinge.



Proper installation of pressure regulator and safety valve.

When such a condition has been found to exist, the service man should bring the cooler back to the shop for repair, or return it to the manufacturer, for complete overhauling.

When inspection of an open or sealed type system by the service man indicates moisture in the system, he should check to see whether or not a drier has been installed. If there is none, he should install one; if one has already been in use, he should check it to determine that it is of proper size and capacity, so that trouble of this sort can be dealt with and future service calls eliminated.

Water leaks which can be repaired in the field include: inlet water spud, bath drain spud, pre-cooler (both top and bottom), waste body and basket, and glass filler cap.

These repairs can be made in the field by the service man, or can be handled in the service repair shop, by removing the water cooler porcelain top and accessories, so that insulation can be removed to get at the source of the trouble.

Too often, relatively minor repairs of this nature are not attempted by the service man or repair shop, whereas they can, in most instances, be easily made in the field.

To manufacturers of refrigerated locker storage plants

BECAUSE we have been receiving inquiries from manufacturers of refrigerated locker storage plants who are redesigning their present units, we feel that other manufacturers who are not familiar with these Temprite products may welcome the following information about them.

TEMPRITE'S TWO TEMPERATURE VALVE is the ideal valve to use on refrigerated locker storage plants when two or more different temperatures are to be maintained in the one plant. These valves are extremely sensitive and can be adjusted for any desired temperature.

TEMPRITE'S OIL SEPARATORS are invaluable in all low temperature systems because they keep crankcase oil out of the evaporator and evaporator refrigerant, thereby obtaining the maximum efficiency and lowest temperatures under all conditions.

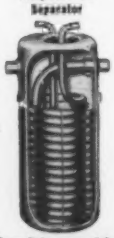
TEMPRITE'S ACCUMULATOR-INTERCHANGER provides a means of using low temperature suction gas to pre-cool incoming liquid refrigerant and also provides a practical method of utilizing the refrigeration effect of raw refrigerant liquid which may leave the evaporator, by storing it until the warm liquid line refrigerant can make use of this available cooling effect.

★ ★ ★ ★

Write our sales department today for complete information about Temprite's engineering service. This service is offered to your designers to assist them in the application of Temprite's standard accessories or the redesign of standard items where they do not meet your requirements.

Temprite's Two Temperature Valve

Temprite's oil Separator


Temprite's accumulator-interchanger

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Originators of Instantaneous Liquid Cooling Devices

41 PIQUETTE AVENUE · · · DETROIT, MICHIGAN

SENSATIONAL AMCOIL "COMFORTAIRE"

a new development in air conditioning

LICENSED UNDER LATENT COOLER PATENTS

REMOVES UP TO 90% OF LATENT HEAT

and the sensible heat is variable

The new AMCOIL COMFORTAIRE CONDITIONER removes up to 90% of the humidity from the air without materially affecting the temperature. Completely automatic wall mounted models, when connected to water cooled condensing units, produce true air-conditioning that heretofore was only possible with expensive reheat systems costing four times as much to operate. COMFORTAIRE creates dry, healthful, comfortable air with no low-temperature shock as in conventional coolers.

USE AS A DEHUMIDIFIER

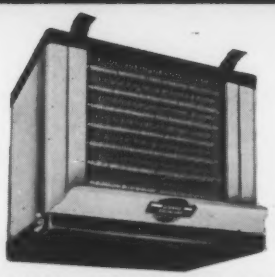
The AMCOIL COMFORTAIRE is also the answer to a long-felt demand for inexpensive de-humidification equipment for many industrial uses. A few are as follows:

PARACHUTE STORAGE	PAPER STORAGE	NYLON & SILK INDUSTRY
TEXTILE INDUSTRY	DRAFTING ROOMS	PAINT SPRAY DRYING ROOMS
PRINTING PLANTS	CANDY STORAGE	INSTRUMENT ASSEMBLY ROOMS

Can be used as a liquid and water reclaimer in Aircraft, Ships, and Lifeboats and numerous other Industrial Applications.

ADDITIONAL AMCOIL UNITS *meet any refrigeration requirement*

AMCOIL FOOD CONDITIONER. A wall mounted unit combining high, controlled humidities up to 85% with temperatures of from 35° to 40° F. Designed for walk-in boxes it automatically preserves foods without dehydration. Can be used effectively to store meats, fruits and vegetables, butter, cheese, eggs, flowers, bakers and confectioners products, to retard dough, etc.



AMCOIL ALSERVICE OPEN FACE COOLING UNIT. Is designed for efficient cooling and serves as a general utility unit in preserving foods and other commodities where a forced draft cooling unit is required. Streamlined design, in attractive grey and black color scheme, it can produce temperatures down to 34° F.

AMCOIL ALSERVICE DOWN DRAFT COOLING UNIT. Is a new idea in refrigeration. It is a straight cooling unit that, should the need for humidity control arise, by the addition of certain parts, the unit is converted into a cooling and high controlled humidity FOOD CONDITIONER with all the advantages of that equipment.

Factory Representatives

P. J. BURRILL, 800 North Clark Street, Chicago, Illinois

AMCOIL

AMERICAN COILS CO.

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Engineers "take the pulse" of a military truck in a man-made gale at 50 below.

Zero was Below

Temperatures and wind velocity are checked before test operations are started.

Army trucks must move ahead, weather or not. Here's how refrigeration helps to fit them for service under severe conditions.

IN a 25-mile an hour gale at temperatures far below zero, Canadian-built military vehicles undergo rigorous tests that fit them for service anywhere short of the North Pole.

The tests aren't taking place in the Arctic, but in a specially designed "cold test chamber" in the experimental building of General Motors of Canada, Ltd., at Oshawa, Ont. The test chamber is the first one of its kind in Canada, and incorporates a number of features which make it unusual among applications of this type.

This super ice-box provides technical experts with first-hand observations on the functioning of army vehicles under the severest types of winter weather. Every factor of temperature and torque can be studied when motor equipment is placed in the room. In addition to testing truck engines, auxiliary equipment such as defrosting apparatus, heaters, etc., also is checked for efficiency.

The chamber itself is rectangular in shape, 40 feet long x 20 feet wide x 17 feet 8 inches high, with walls, floor, and ceiling insulated with 14 inches of corkboard. Two special doors, each approximately 9 feet square, comprise one end of the room, permitting a clear opening 18 feet wide and 9 feet high, through which trucks, tanks, and other large vehicles can be driven into the room. Doors to the chamber are provided with safety exit devices. Special equipment to detect fumes has also been installed.

Upper half of the room is separated from the lower half by a cork-insulated deck, on which the cooling coils are located. Two large blowers occupy one end of the main floor of the chamber. These are mounted on a common shaft extended through a wall, and are driven by a single motor.

Compressors and auxiliary equipment are located in a room extending across the rear end of the building and along one side of the cold chamber.

Two basic conditions had to be met by the refrigeration equipment: first, to maintain a temperature at the return inlet to the cooling coils of —20° F. or lower when the full load of 105 H.P. engine was imposed on the room; secondly, to maintain a temperature of —50° F. at the inlet to the cooling coils when all heat loads except the 105 H.P. engine and

carburetor air were imposed. This last condition was required for cold-start testing of the engine.

Refrigeration is supplied by means of a two-stage compression system using direct expansion ammonia cooling coils as an evaporator, operating under flooded conditions through the use of a liquid ammonia recirculating system.

Operating Cycle

Operating cycle of the system is as follows:

Liquid ammonia is carried from the high pressure receiver through a direct expansion liquid precooler to a low pressure float control, and maintains a constant liquid level in the ammonia surge drum located above the deck in the test room. Ammonia in this surge drum is recirculated through the direct expansion ammonia coils by means of a recirculating pump located in the machine room.

Ammonia gas evaporated in the flooded cooling coils by the high velocity air passing over them separates from the liquid ammonia in the surge drum, and returns to the low stage vertical single acting compressor under a high vacuum.

Discharge gas from the low stage compressor passes through a water-cooled gas cooler, and thence to a direct expansion liquid cooler, equipped with a low pressure float control and supplied with liquid ammonia from the high pressure ammonia receiver. Warm gas from this cooler, together with the heat of the liquid ammonia flowing to the surge drum float control, eavporates the liquid ammonia in the shell of the direct expansion cooler. This gas returns to the suction side of the higher second stage compressor.

This compressor discharges directly into a conventional horizontal shell and tube condenser, and liquid ammonia returns from it to the high pressure ammonia receiver.

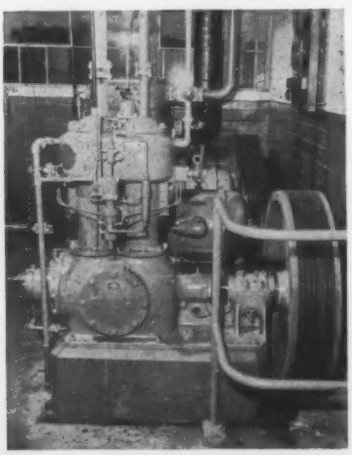
Use of the liquid recirculating system, together with thermostatically controlled automatic capacity reducing bypasses on the compressors, is said to make the system quite flexible in operation, and capable of adjusting itself to any load condition without requiring manual adjustment.

Engineers working in the cold room are under observation from a control room outside. The control board, which permits constant checking on temperatures of any part of the vehicles, also governs the intensity of the wind velocity inside the test chamber.

NEW COMPANY

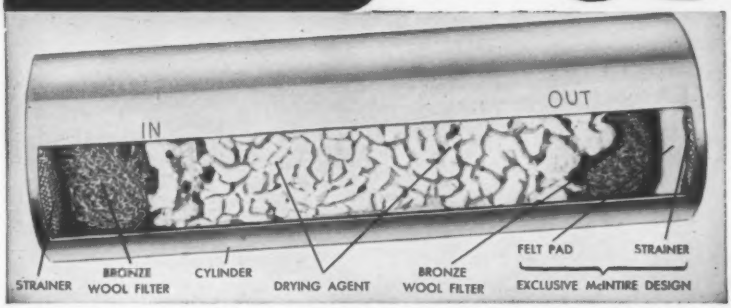
Drew N. Martin, head of Engineering Service, Inc., has organized Plate Refrigeration, Cleveland, Ohio. The company will manufacture refrigeration units for locker plants.

The two-stage compression system which provides refrigeration is in a room adjoining the test chamber.



3-WAY PROTECTION FOR EVERY INSTALLATION!

NO MOISTURE
NO SEDIMENT
NO ACID



One DFN cartridge does *three* jobs. It adsorbs moisture. It filters sediment. It neutralizes acids. And it's the *only* unit that offers you this triple protection.

The uniformly packed, dust-free, reactivated drying agent removes all dangerous moisture. The packing is mechanical, insuring correct quantity and density to each cartridge to permit free flow of refrigerant up to rated capacity. An exclusive anti-sediment assembly covers the *complete area* of the outlet which filters the refrigerant through multiple layers of bronze wool, felt and wire mesh. Positive filtering action is secured—the smallest particles being retained in the cartridge.

When a DFN cartridge's long service life is ended, it is easily removed from the DFN shell and a new cartridge put in its place. No time consumed refilling with dehydrant on the job—no danger of loose packing. Hermetic sealing of the cartridge container insures a complete drying unit *when wanted.* Ask your distributor for this unique, triple-action DFN unit.

McINTIRE CONNECTOR COMPANY
NEWARK 5, NEW JERSEY

Only the DFN SYSTEM
DEHYDRATES FILTERS NEUTRALIZES
DEHYDRATORS • STRAINERS FILTERS • NEUTRALIZERS

POSTWAR . . .
Continued from page 38

cabinet and door to stiffen the metal, make imperfections of finish less noticeable, or minimize vibrations which accent sounds produced by the unit. It would be better to use the next gage heavier metal and make the job smoother so that it is easy to wipe clean, even if this does increase the weight a bit.

Shelves that Will Let Small Bottles Stand Solidly:

This criticism is related to the one about the difficulty of cleaning the shelves. If we make the shelves like a woven-wire fence, they are hard to clean and do not present a good flat surface for the base of a bottle or a cream pitcher. We may be on the way toward shelves, which are usable if we do not have to depend so much upon air circulation through the shelves to cool the food space.

A Means of Opening the Door with Both Hands Full:

This is a good idea, but it should not be done with an "electric eye" nor a foot pedal. Either would often act to open the door at the wrong time and might cause accidents to dishes or to small children.

The solution of this is one of the things about which I cannot talk much at present, but it is in some of my own post-war designs.

"PER COIL" PRICING

Prices on Wolverine copper tubing are now being listed on a "per coil" rather than a "per pound" basis, the company has announced. As soon as packaging materials are available, tubing will be packaged in an individual carton designed to contain a 50-foot coil, to make the handling of tubing sales more convenient for the refrigeration parts jobber. Pricing revisions represent no increase, and have been approved by OPA.

SMALL PARTS MAKER

Specializing in the production of small precision metal parts, the Wadsworth Watch Case Co. has established a small parts division as a postwar development. At the present time, the company is making these types of parts for some 45 manufacturers in the refrigeration, aircraft, automotive, tool, and other industries.

The MARKET Place

The rates for this department are as follows: minimum charge—$2.00, 25 words. Each additional word, 10c.

Bold type or all capitals: minimum charge—$3.00, 25 words. Each additional word, 15c.

Box number or address not included in word count. All classified advertising payable in advance.

Address all communications to this department:
CLASSIFIED ADVERTISING DEPARTMENT
THE REFRIGERATION INDUSTRY
812 HURON ROAD
CLEVELAND 15, Ohio

POSITIONS AVAILABLE

SERVICE MANAGER wanted by major manufacturer for domestic refrigerator department. Must have background in refrigeration and working knowledge of production and distribution methods. Must furnish good references, and be available at once. Give full details of past experience in first letter. Box D52, Refrigeration Industry.

REFRIGERATION SERVICE MAN with knowledge of commercial refrigeration, to help develop commercial servicing department in expanding organization. Starting rate 90 cents per hour, plus commission, expense account, and car allowance. Give full details about yourself and your experience in first letter. Box D53, Refrigeration Industry.

FIELD SERVICE MEN wanted by nationally-known manufacturer of household refrigerators. Desirable positions for men who can qualify, assured future. State qualifications and salary requirements in first letter. Box D54, Refrigeration Industry.

SERVICE MANAGER, by prominent manufacturer of domestic electrical appliances. Should be well acquainted with washing machines, electric ranges. Immediate position with excellent post-war future. Box D55, Refrigeration Industry.

FOR SALE

Factory rebuilt Temprites, new valves. 25 Series $100.00—50 Series $125.00. Surge Tanks $15.00. Box D56, Refrigeration Industry.

FOR SALE (Cont'd)

FOR SALE: Complete refrigeration business, including fully equipped shop, in thriving western city. Write Box D-60, REFRIGERATION INDUSTRY.

"VICTOR ICE MAKER"—(used) Capacity 1000 Lbs. 3 H.P. Frigidaire Unit—good equipment—does not fit our plans. Low Price. Clements & Parker—Danville, Va.

HELP WANTED

REFRIGERATION SERVICE MEN—We are rebuilding our Service Department and have need for three experienced service men immediately. These men will act as instructors in the field for trainees this winter. This is an opportunity for ambitious men who wish to improve themselves. We are an established growing organization, distributors for York and Kelvinator commercial refrigeration and air conditioning—no domestic. From 80c to $1.20 per hour. Transportation furnished. Qualifications first letter. Write W. R. Kromer, Oil Heating Devices, Inc., 1835 E. 24th Street, Cleveland 14, Ohio.

MANUFACTURERS!

Do you now have authorized service facilities in Boston and Metropolitan area? And if so, will they be satisfactory for the post war business you are planning? If not, now is the time to get set.

Our firm have been service specialists for eighteen years and serve an area of two million people. We are well financed and have competent employees and ample facilities, shop space, trucks, stock rooms, etc. to do a fine job for you. We are familiar with air conditioning, domestic and commercial refrigeration, low temperature applications, including ice cream freezing and food freezing. We can offer complete service from application engineering to warehousing, delivering, installing and servicing on all kinds of refrigeration or other major appliances. We would appreciate an opportunity to discuss the possibility of making our service department YOUR service department.

MILLER & SEDDON CO., INC.
2089 Massachusetts Ave.
Cambridge, Massachusetts

PHOTO FINISH

When Navy photographers in the South Pacific discovered the Seabees' York "FlakIce" machines, they solved the problem of keeping developer solution cool enough to permit proper development of negatives, despite high climatic temperatures.

Working in makeshift darkrooms, the photographers were having trouble in getting the sharp detailed pictures necessary for record photography. High temperatures caused the carbonates in the developer to expand the pores in the gelatin beyond the ability of the restrainer to control them.

To keep the developer between 65° and 70° F., photographers borrowed enough ice to keep a tin of developer, placed within a larger tin, packed in ice as long as required.

THE PRACTICAL REFRIGERATION ENGINEERING MANUAL and REFERENCE LIBRARY

III. THE THIRD STEP IN DEVELOPING AN APPLICATION ENGINEERING PROBLEM IS TO DETERMINE TOTAL PRODUCT LOAD

By
Harold Smith

AUTHOR'S NOTE:

This Manual has been written expressly to meet the needs of the many workers in refrigeration who do not have formal training in engineering.

The engineering information in these articles has been assembled from the many books on refrigeration already available. It is presented in a manner designed to enable any man with a reasonable working knowledge of refrigeration to properly select equipment for satisfactory operation and results.

All essential data—factors, rules, tables—has been combined for quick, simple reference and usage.

While these manuals do not constitute a complete course in refrigeration, attention to and use of the information presented will enable the service man to work out specifications for most types of applications.

At a later date, it is planned to provide binders for these articles, so that they may be kept in handy book form.

CHAPTER III (Cont.)... PRODUCT LOAD

WHEN estimating product loads in retail establishments, it is sometimes difficult to figure the product load in detail, because of limited information regarding the weight of products moving in and out of the cooler. In cases of this nature, a simplified formula can be used that will provide reasonably safe figures. This formula should be used in only retail service, and then only when the product has previously been processed and brought down to temperature.

Simplified Formula

Heavy service in and out of cooler (fast sale of product)—⅓ of heat leak and service load, represents product load per hour.

Medium service in and out of cooler (medium sale of product)—¼ of heat leak and service load, represents product load per hour.

Light service in and out of cooler (light sale of product)—⅕ of heat and service load, represents product load per hour.

At the end of Chapter II on Service Load we used as an example an 8′ x 10′ x 9′ service cooler with medium service load.

The figures are as follows:

Heat leak	1597 B.T.U.'s
Service Load	1452 B.T.U.'s
Total	3049

Load Figures

Using simplified formula for product load, medium service and sale (¼ of total heat leak and service load above) gives us a product load of 762 B.T.U.'s per hour.

We now have figures for a complete refrigeration load:

Heat leak	1597
Service Load	1452
Total	3049
Product load (medium)	762
	3811
10% safety factor	381
Total refrigeration load B.T.U.'s per hour 24-hour operation.	4192

Lightening the Load

More specifically, the condensing unit must produce 4192 B.T.U.'s each hour of a 24-hour period to handle this load. As it would not be desirable for the condensing unit to be in continuous operation, the hourly load per 24 hours of operation should be converted to a load that could be taken care of by the condensing unit in 16 or 18 intermittent hours of operation.

By adding to the total refrigeration load an amount equal to one-third of this figure we have the hourly load on an 18-hour operation; by adding an amount equal to one-half of this figure, the hourly load on a 16-hour operation.

For example, using the refrigeration load above, total load requirements for 18-hour operation would be ⅓ higher than 4192, or 5589 B.T.U.'s per hour; for 16-hour operation, the total would be 4192 plus ½, or 6288 B.T.U.'s.

We now have total load requirements, on either 16 or 18-hour operation, for the example we have carried in the first three chapters. The next step is to select condensing units and evaporators to handle the load.

BTU'S . . .

Continued from page 20

Under the first order, aluminum may now be used for ice trays; production of cabinets of this material would give rise to many production problems, and is unlikely in the immediate future, at least. The second order allows experimental models costing up to $5,000 a month in one plant, including all costs. The "spot authorization" order will depend upon cut-backs in military production and availability of labor.

Avoidance of unemployment is basic in WPB's policy, and when production is started again, any qualified company can enter the field, regardless of whether or not it has made refrigerators in the past. Burden of production, however, will be upon established manufacturers. If a company is engaged in war production to the extent that it cannot get started in the civilian field along with others, WPB may allow sub-contracting to afford some relief.

In any event, the manufacturer must obtain labor clearance from WMC before he is allowed to resume production of civilian products. As long as the labor can be used in his own plant, in other plants in his area, or in other areas, he cannot use it for expanding civilian production.

—o—

IN THE three previous chapters on Heat Leak, Service Load, and Product Load, we described methods of determining the total refrigeration load.

With the total refrigeration load figures established, the next step is to select the condensing unit to be used.

There are a number of conditions that should influence this decision. First is whether to use an air-cooled or a water-cooled unit. Each type unit has advantages which must be considered. The air-cooled type is widely used in machines up to 2 hp., as it contains fewer parts to get out of adjustment. Less material is used for installing, and the installation generally can be made more quickly. The unit can be installed in a location not heated in winter, but on the other hand must be installed where the air is not too hot, as the surrounding air is used as the condensing medium.

The water-cooled type unit offers more uniform capacity, as water temperatures do not change as rapidly as air temperatures, and are usually cooler. The cost of water consumed for condensing is an added operating expense, and additional parts must be supplied with the unit, which increases its initial cost, adds to the cost of installation, and necessitates additional adjustments and replacements. Care must be used to install in heated locations, otherwise the water will freeze in the winter, causing serious trouble and expense.

Manufacturers of condensing units rate the machines based on the evaporating temperature degrees F. and the condensing temperature. Most air-cooled units are rated at 90° F. room temperature, or condensing temperature, and care must be used that they are placed where the temperature, particularly during the peak summer load period, does not greatly exceed 90° F. For each degree increase of condensing air temperature, a reduction of .5% should be made for reduced unit capacity from the listed capacity ratings. For each degree decrease in condensing air temperature, an increase of .5% may be added to the capacity.

Water-cooled units are usually rated at incoming water temperatures of 75° F., and the capacity of the units increase or decrease with the change of the water temperatures, as in the case of the air-cooled units.

The capacity of the condensing unit varies with the evaporating temperature. The higher the temperature, the greater capacity the unit produces. It should also be noted that when the evaporating temperatures are below zero, and particularly when the condensing unit operates at a vacuum, the capacity drops off very rapidly.

It is usually considered good practice to operate the condensing unit at a high evaporating temperature, to secure maximum unit capacity. An evaporating temperature 10, 15 or 20° colder than the temperature of the refrigerated space is the standard temperature difference usually selected. However, when it is desirable to use small evaporators, or when low humidity is required, temperature differences of 25 and 30° are used.

(To be continued next month)

MOTORS

THE electric motor industry is now doing about five and one-half times its pre-war business, with the percentages 15 to 85 in favor of military production. Production at the present time is about 400,000 motors a month.

To assure better distribution of electric motors, WPB has issued a new order (L-341) which requires users to state their past usage and what motors they require for future production in a quarterly report. By comparing these figures with approved production schedules for motor using equipment, it is believed that provision can be made for essential uses.

The new rules provide that persons using more than 450 fractional (or 75 single phase integral horsepower) motors a quarter will not be allowed to accept delivery if they have not filed reports on their requirements. The new order also requires distributors who receive motors allotted on form WPB-547 to distribute them for replacement uses.

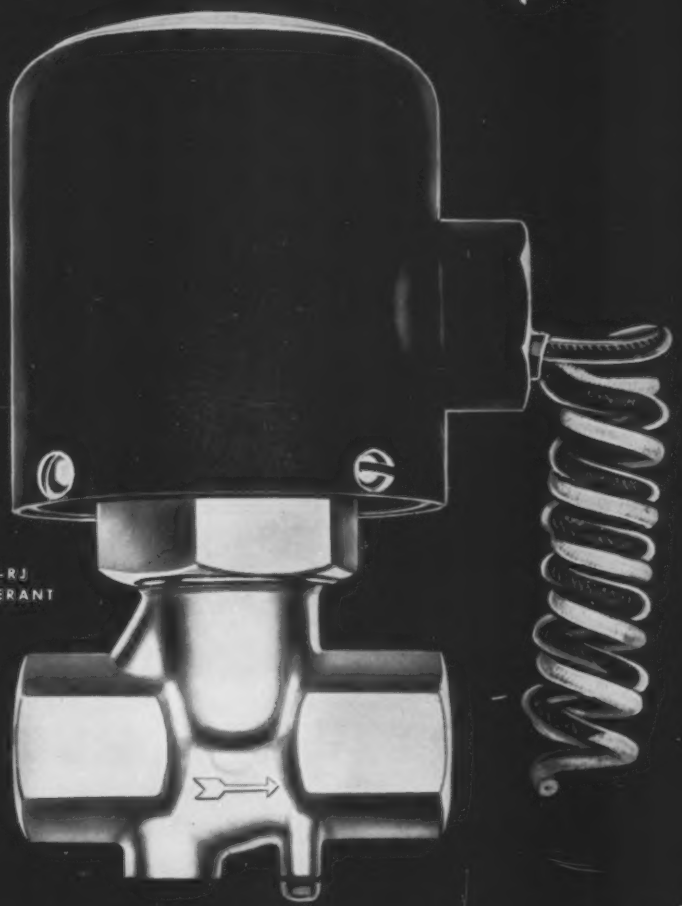
—o—

CMP-5 RULING

Plants engaged in more than one activity may use the preference rating assigned under CMP Regulation 5 to the principal part of their business to obtain maintenance, repair and operating supplies for all their activities, WPB points out. Plants that produce one item during an entire year and another for only a part of that year may follow this general rule.

Dependability doesn't happen...

IT'S *BUILT INTO* EVERY AP VALVE



A-P MODEL 73-RJ
SOLENOID REFRIGERANT
VALVE

This small, compact solenoid is popular with both manufacturers and service engineers alike, because of its unusual features in design, simple construction, positive, quiet, "trouble-free" operation, and easy inspection.

Adaptable to most commercial refrigeration and portable air conditioning applications, A-P Model 73-RJ is capable of operating at pressure differential of 180 lbs. p. s. i. "Wrap-Seal" coils, water and frost-proof, are "over-powered" for ample lifting power even during reduced voltage and heavy load periods. It can be easily and quickly disassembled for inspection and cleaning *without removing from the line.* Maximum capacity: Liquid line, 7.4 tons Freon at 6 lb. drop; Suction line, ½ ton Freon at 2 lbs.

AUTOMATIC PRODUCTS COMPANY

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Export Dept.—13 E. 40th St., New York 16, N. Y.

DEPENDABLE
REFRIGERANT VALVES

Stocked and Sold by Progressive Refrigeration Jobbers Everywhere — Recommended and Installed by Leading Refrigeration Service Engineers.

We Distribute and Stock A Complete Line of

DETROIT DURA-FRAM EXPANSION VALVES

No. 892

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FEATURES THAT ASSURE BETTER REFRIGERATION PRACTICE

GAS CHARGED POWER ELEMENTS—Assure motor overload protection, maximum sensitivity, quicker balancing of the system, with no flood-backs and no lag in pull-down.

LIQUID CHARGED POWER ELEMENTS—Assured constant functioning under varying installation conditions. Valve will operate satisfactorily even though valve body becomes colder than bulb during off cycles. Ideally suited for general replacement requirements.

SINGLE DIAPHRAGM CONSTRUCTION—Provides a smaller, more compact valve easier to handle and install.

RELIABLE DIAPHRAGMS—Made of a special alloy, carefully tested for flexibility to assure uniform capacities and smooth operation.

COMPLETE LINE—Include both automatic and thermostatic valves, adjustable and non-adjustable types—capacities up to 20 tons on Freon.

NO RESTRICTION AS TO LOCATION—Dura-fram Valves may be located at any convenient point—even in the refrigerated compartment, without jeopardizing their full effectiveness.

DELUBALOY NEEDLES AND SEATS—Four years of constant service in Detroit valves have proved the superiority of this hard, corrosion resistant alloy.

IMPROVED INLET CONNECTION—Makes installation simpler and quicker for both new and service work.

SILVER-BRAZED POWER ELEMENT JOINTS—Prevent refrigerant loss under any contingency.

SPECIAL BRASS BODY CASTINGS—Although more expensive to produce, castings of this type have made such a perfect record in earlier Detroit valves that they are used also for Dura-fram Valves.

PRE-COOLED HIGH SIDE LIQUID—In the larger size valves high side liquid is pre-cooled before reaching the orifice. This reduces the volume of entrained gas and produces a denser stream through the orifice with improved balance in the system.

FLEXIBILITY — Capacities of the larger valves may be readily changed in the field merely by changing selective capacitators or seat assembly.

UNITED REFRIGERATOR SUPPLY CO.

366 S. MAIN STREET MEMPHIS, TENN.